NATO Explosive Ordnance Disposal
Centre of Excellence - Slovak Republic

FORMER WARSAW PACT AMMUNITION HANDBOOK

VOLUME 1
Land Forces Ammunition

Explosives, Projectiles and Grenades

TRENČÍN 2015

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Land Forces Ammunition

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The NATO Explosive Ordnance Centre of Excellence (NATO EOD COE) supports the efforts of the Alliance in the areas of training and education, information sharing, doctrine development and concepts validation.

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Even though in areas of current NATO operations the insurgency is using Home Made Explosive as the main charge for IEDs, our EOD troops have to cope with the use of conventional ammunition in any form and size, all around the world. To assist in saving EOD Operators' lives and to improve their effectiveness at ammunition disposal, it is essential to possess the adequate level of experience and knowledge about respective types of ammunition. The identified information gap on conventional ammunition produced in the past in Former Warsaw Pact countries has led the NATO EOD Centre of Excellence to develop a product to mitigate this shortfall.

You are about to start using the NATO EOD Centre of Excellence's Handbook on Former Warsaw Pact Ammunition that is meant to effectively assist NATO and Partner Nations' Staff Officers and NCOs at the battalion and brigade levels by providing a ready reference and guidance for Ammunition Technicians, EOD Troops and Combat Engineers dealing with conventional ammunition. Its aim is simply to assist in understanding of the construction of this type of ammunition and its safe disposal. The leading motivation behind this handbook is a large number of the ammunition described within that is still used all around the world.

This Edition is not to be considered as an end product. My team will improve its content by adding more information to the next issue to better support our EOD troops' daily endeavors.

Director, NATO EOD Centre of Excellence

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INTRODUCTION

1.1 Purpose

The information and guidance contained herein will help EOD staff officers and EOD operators to safely handle munitions. It is designed to gain an overall view of the construction of Former Warsaw Pact (FWP) ammunition to improve knowledge, to positively identify of ammunition, and to safely dispose of unexploded ordnance, abandoned ammunition and stockpiles.

1.2 Scope

This handbook is a first volume of the editorial sets. The first volume contains general information about FWP explosives, information about hand grenades, artillery ammunition and mines and charges.

The second volume deals with rocket and missiles, artillery rocket and light antitank weapons and third volume will contain aerial ammunition.

The handbook discusses the construction, classification, identification and marking of FWP ammunition. The handbook is not a comprehensive manual, but it does provide useful data on important points of ammunition.

1.3 Terms and definitions

Background of military terms, definitions and classification which are used in this publication are based on the conceptual apparatus used in the FWP; of course definitions of physical, chemical and mechanical processes do not recognize borders and therefore contain only formal differences. However, for a better understanding and to help users Annex D contains definitions used in NATO, as set out in military references such as AAP-6, AOP-38, AOP-19, etc.

1.4 Distribution and using

This handbook is published as a loose-leaf bound printed copy or as an electronic document for participant of courses. Persons having no further use for printed copies of the document are requested to return them to the editor of this document.

Explosive Ordnance Disposal Centre of Excellence authorizes official use of this handbook only for Former Warsaw Pact Ammunition Course with the principles “For Official Use Only”.

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CHAPTER 1
EXPLOSION AND TYPE OF EXPLOSIVES

0101. EXPLOSION

1. **Definition of an explosion.** An explosion is a very fast physical or chemical action in which there is the rapid release of energy. Part of the released energy is then used to generate mechanical work by expanding gases (to accelerate projectiles, provide rocket propulsion, produce fragmentation by shattering projectiles, and so on) or destructive effect by spreading shock waves in the open (the destruction of objects and people). Explosion causes may be different, chemical reaction, nuclear, or physical but they all result in a sudden change in physical state due to an exothermic reaction.

2. **Physical explosion**. Physical or mechanical explosion is a sudden change of physical state caused a rapid decrease in the potential energy of the system (sudden release of mechanical energy). It may prove to be an explosion or implosion. For example a mechanical explosion is destruction of a pressure tank (a boiling liquid expanding vapour explosion, BLEVE). An implosion is destruction of the vacuum system, for example a cathode ray TV tube. During the physical explosion, the chemical nature is not changed; there is only a change of physical conditions before and after the explosion (pressure, volume, temperature).

3. **Chemical explosion.** The term chemical explosion is spontaneously and high velocity spreading chemical reaction and releases of a large quantity of gas and a large amount of heat (heat of explosion). An explosion produces a shock wave in the surrounding medium. The chemical explosion is changing the chemical nature of the system. Substances capable of chemical transformation called explosives.

4. **Nuclear explosion.** The nuclear explosion is an explosion whose energy is produced by a nuclear transformation, either fission or fusion of nuclei of atoms. It has thermal, mechanical (blast) and radiological effect.

0102. TYPE OF CHEMICAL EXPLOSION

1. **Detonation velocity** is the velocity of the explosive reaction in the explosive during detonation. A characteristic of explosive transformation is high velocity, but this can vary depending on the type of explosives, explosion conditions, and the means of initiation. The measure of velocity of explosive transformation is the linear velocity. According to a linear velocity are two types of explosive transformation:
   - Explosive burning;
   - Detonation.

2. **Explosive burning.** Explosive combustion is a type of chemical transformation characterized by the following properties:

- The linear velocity of a burning chemical reaction is relatively low, rarely exceeding 100m/s and is always lower than the speed of sound in the combustion gases of explosion,
- The density of the combustion products is always lower than the initial density of explosives,
- Explosive burning in the open air is not accompanied by a shockwave resulting in no loud sounds or the performance of mechanical work with destructive effects on the environment (gaseous reaction products are enough to leave the area without generating pressure waves);

3. **Detonation.** The detonation is a type of chemical transformation characterized by the following properties:

- Linear velocity of the explosive conversion spread is in the ranges from 1000 to 10,000 m/s; it means the velocity of detonation is always greater than the speed of sound in the detonation products of the explosive.
- Explosive transformation is characterized by rapid increase of pressure at the place of explosive transformation (10 to 40 GPa).
- Formation of shock waves is accompanied by the destruction effect on the surrounding environment.
- Density of detonation products at the head of detonation wave is always greater than the initial density explosives.

0103. **EXPLOSIVES**

1. **Definition.** Explosives are substances or a mixture of substances which may be made to undergo a chemical change caused by external stimulus without an outside supply of oxygen (initiation) with the liberation of large quantities of energy generally accompanied by the evolution of hot gases. The energy released by the explosion is used to provide proplusion and shatter the casings of munitions.

0104. **BASIC CHARACTERISTICS OF EXPLOSIVES**

1. **Basic characteristics**. Each military explosive has to strictly comply with basic properties of explosives:

a. **Sensitivity** – the susceptibility of an explosive to respond by chemical changes to external stimulus, such as the initiation by externally applied energy;

b. **Stability** – the ability of an explosive has not to change their physical, chemical, and the explosive properties; resisting to spontaneous ignition, detonation, or deterioration under normal storage conditions;

c. **Working ability** - is expressed by amount of mechanical work carried out by the evolution of hot gases and the following shock wave;

d. **Brisance** - the primary strike force caused by detonation waves to a test surface. It is the shattering effect shown by a detonating explosive to an ad-

jacent non explosive material. The amount of brisance is related to the detonation parameters of the explosive (detonation velocity, detonation pressure).

0105. **GENERAL CLASSIFICATION OF EXPLOSIVES**

1. In the Former Warsaw Pact, there the explosives were divided into following classes:

a. Propellants;
b. Primary explosives;
c. Secondary explosives;
d. Pyrotechnic compositions.

0106. **PROPELLANTS - POWDERS**

1. **Definition.** Propellants are low-explosive substances or their mixture, which through burning can be made to produce gases at controlled rates and provide the energy necessary to propel ordnance. It makes them suitable for the following applications:

a. Propelling projectiles up a barrel by the pressure of gaseous products of combustion acting on the bottom of a projectile;

b. Expansion of the gaseous products of combustion through a rocket engine venture and out a nozzle;

c. Combination of the both above mentioned (projectiles with additional rocket engines, etc.).

2. **Types of propellants**. Propellants are divided into following classes:

a. Black powder;

b. Smokeless powders:

– With a volatile solvent (nitrocellulose powders);
– With non-volatile solvents (nitro-glycerine and di-glycol powders);

c. Solid propellants:

– Homogeneous (two-component colloidal);
– Heterogeneous (mixed).

3. **Black powder.** Black powder is a mechanical mixture of potassium nitrate, charcoal and sulphur (60-75% KNO3, with 10-17% S, 10-15% C). The most common composition of black powder is 75% KNO3, 10% sulphur and 15% charcoal. In terms

of applications in ammunition elements black powder is classified in the following types:

a. Granular (filling of igniter, filling of primer screws, propelling charge, etc.);

b. Powdered (safety fuses, relays, quick match, etc.);
c. Timing (artillery fuses with delay effects).

4. **Smokeless powder**. Types of smokeless powders:

a. Single-base powder - Nc- powders (nitrocellulose powders);

b. Double-base powder - Ng-powders (nitro-glycerine powders);
- **Dg**-powders (di-glycol powders);

c. Triple-base powders - **Gu**-powders (Nitro-guanidine or gudol powders, double-base powder with nitro-guanidine).

5. **Solid propellants.** Types of solid propellants:

a. **Homogeneous** - a Double-Base powder with additives to stabilize combustion and burning rate catalysts (e.g. Fe-Cr-, Ca-, Mg-, Ti-salt),

b. **Heterogeneous** - oxidant mixture (perchlorate, ammonium nitrate, etc..) and fuel (polymeric substances), which also serves as a binder of a heterogeneous mixture. Powdered metals (especially aluminium) can be added to increase the energy content.

6. **Marking of propellants "Former Soviet Union"**

a. **Type of powder**

(1) Nitrocellulose based powder is not marked as to the type of powder;

(2) **Н** - nitro-glycerine based powder;

(3) **ДГ**- di-glycol based.

b. **Shape of powder grains**

(1) **Tube shaped propellant.** The tube, tubular and multi-perforated powders are marking by math fraction. The numerator marks thickness of wall in mm, the denominator marks number of perforation (holes in tube).

Example:

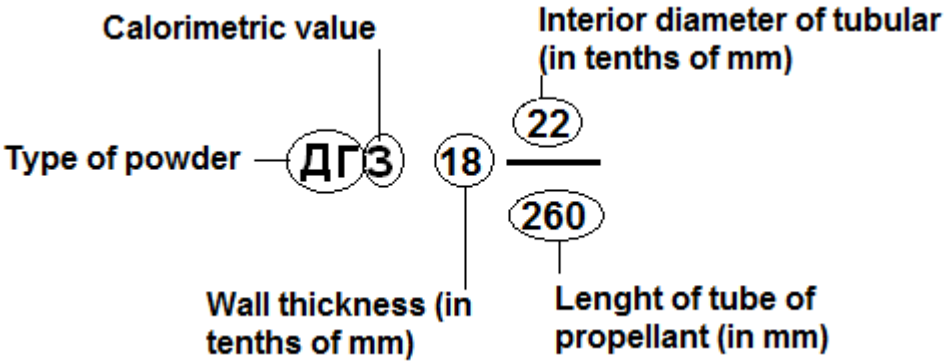
$$\frac{4}{1} \text{ or } 4/1$$

The nitrocellulose tubular powders are marked as powder with one perforation, after the fraction the letters Tp are added.

Example:

22/1Tp

Dimension of **di-glycol powders** are marked as follows:



Or

ДГ3 – 18 22/260

(2) **Plate shaped propellant.** The plate powders are marked with letters ПЛ (PL) and numbers which indicate the thickness in tenths of mm and edge length in tenths of mm. **ПЛ – h – L** (h-thickness of wall and L-edge length).

Example: **ПЛ – 12 – 10**

ПЛ - Plate shaped propellants; h - Thickness of wall is 0, 12 mm;
L - Edge length is 1 mm.

(3) **Strap shaped propellant.** The strap (or ribbon) powders are marked with letter **Л** (L) and with number which indicate the thickness in tenths of mm. **Л – h** (h - thickness of plate).

Example: **Л - 35**

Л – Strap shaped propellant, **h** - Thickness of plate is 0. 35 mm.

(4) **Disc shaped propellants.** The disc powders are marked with letter **К** (K) and with number which indicates the interior diameter in mm, exterior Diameter in mm and thickness of disc in tenths of mm. **К Ф1/Ф2 – h** (**Ф1**- Interior diameter, **Ф2** – Exterior diameter, **h** – Thickness of disc)

Example: **К 32/65 – 14**

К - Disc shaped propellant, **Ф1** - Interior diameter is 32 mm,
Ф2 - Exterior diameter is 65 mm, **h** - Thickness of disc is 0. 14 mm.

7. **Marking of propellants the former Czechoslovak Army.** The meaning of letters and numbers in the nomenclature of marking smokeless powder in the former Czechoslovak Army:

a. The first two letters indicate the type of powder:

- **Nc** - Nitrocellulose based,
- **Ng** - Nitro-glycerine based,
- **Dg** - Di-glycol based,
- **Gu** - Nitro guanidine (gudol) based,
- **Pe** - Penthritte, (PENT, nitro penta) based,
- **Nm** - Nitrosamine based.

b. Combination of other two letters, respectively numbers (7, 19, 49) with the letter **"p"** to indicate the shape of the powder grains:

- **tp** - Tubular,
- **vp** - Cylindrical,
- **dp** - Plate powder,
- **kp** - Disc powder,
- **pp** - Strap powder,
- **sp** - Spherical powder,
- **7p** - Seven perforated (hole),
- **19p** - Nineteen perforated (hole),
- **49P** - Forty-nine perforated (hole).

c. Another two or three numbers (in the case of spherical powder is only one number) indicates the dimension of the powder grain in mm:

– **Tubular**	– exterior diameter x thickness of wall / length,
– **Cylindrical**	– cylindrical diameter / height,
– **Plate**	– thickness / edge length,
– **Disc**	– exterior diameter x interior diameter / thickness,
– **Strap**	– thickness / width / length,
– **Spherical**	– diameter,
– **Seven perforated**	– diameter x thickness of wall / length,
– **Nineteen perforated**	– diameter x thickness of wall / length,
– **Forty-nine perforated**	– exterior diameter x thickness of wall / length,

d. The following basic data followed other written or numerical data, which indicate the order of other parameters of powder such as: explosion heat (for Nc powder explosion heat is not mentioned), additives, surface finish, purpose of use, factory, series and year of production as follows:

- number e.g. **8. 5** - explosion heat of hundreds of kcal/kg,

- **K** - addition of potassium sulphate,
- **N** - addition of potassium nitrate,
- **V** - addition of potassium tartrate,
- **F** - finish Centrality I (ethyl centralite)
- **FI** - finish camphor,
- **RI** - rocket propellant,
- **RM** - rocket propellant with a mixture of stabilizers,
- **RM-CI** - rocket propellant with stabilizer Centralit I,
- **P** - powder for pistol ammunition,
- **C** (originally Cv) - powder for practice ammunition,
- **PC** -powder for pistol practice ammunition.

Example of powder marking: **Nctp 2.4x1/3 K F PC nma 8/85** means:

- a nitrocellulose tubular powder (**Nctp)** with dimensions Ø of **2.4** mm,
- **1** mm (wall thickness)
- **3** mm (tube length)
- the addition of potassium sulphate **(K)**
- surface finish by Centrality I **(F)**
- pistol practice ammunition **(PC)**
- manufacturer brand **(nma)**
- series No. **8**
- the year of production - 19**85**.

0107. **PRIMARY EXPLOSIVE**

1. **Definition.** Primary explosives are explosive substances characterized by high sensitivity to heat and shock (flame, spark, friction, stab, impact, etc.) and which are normally used to initiate a secondary explosive. Primary explosives are capable of proceeding from deflagration to detonation in an extremely short distance and time. The data referred to in definition are not available for all primary explosives. The most used explosives are:

a. Lead azide,
b. Mercury fulminate,
c. Lead styphanate,
d. Tetracene.

2. **Order of sensitivity**. The sensitivity of explosives to spark and mechanical stimuli are decreasing in following order.

a. **Spark**:
(1) Lead styphanate,
(2) Mercury fulminate,
(3) Tetracene,
(4) Lead azide.

b. **Impact**:

(1) Tetracene,
(2) Mercury fulminate,
(3) Lead azide,
(4) Lead styphanate.

c. **Friction:**
(1) Mercury fulminate,
(2) Tetracene,
(3) Lead styphanate,
(4) Lead azide.

d. **Puncture**:
(1) Tetracene,
(2) Mercury fulminate,
(3) Lead styphanate,
(4) Lead azide.

0108**. SECONDARY EXPLOSIVE**

1. **Definition.** A secondary explosive is an explosive in which the main type of explosive transformation is a detonation. They are relatively insensitive to heat and shock but detonate when initiated by a shock wave. The secondary explosives usually initiated by a primary explosive. Explosives are divided by:

a. **State**:
- Solid,
- Liquid,
- Plastic.

b. **Field of use**:
- Military,
- Industrial.

c. **Chemical compound**:
- Single compound explosives,
- Mixed explosives.

2. **Single compound secondary explosives.** The single compound explosives contain only one chemical component (excluding the presence of any other component as incidential contamination). The main types of single compound secondary explosives are:

a. **Nitric esters.** Esters of nitric acid with characteristic groups **— O NO2,** e.g. Penthrite (Np, PETN), Nitro-glycerine (NG), Diethylene glycol dinitrát (DEGDN), nitrocellulose (NC) and so on.

b. **Nitro compounds.** Nitro group with characteristic groups **– NO2,** e.g. Trinitrotoluene (TNT), Picric acid, Hexa-nitrostilbene (HNS), Tri-aminotrinitrobenzene (TATB) and so on.

c. **Nitro amines.** Nitroamines with characteristic groups **– N - NO2,** e.g. Hexogen (RDX), Octogene (HMX), Nitro guanidine (NQ) and so on.

d. **Salt of Nitric acid**. Salt of nitric acid with characteristic groups **- NO3,** e.g. Amonium nitrate (AN), Guanidine nitrate (QN), Hydrazine nitrate and so on.

3. **Mixed explosives.** For military purposes there are mostly used mixed explosives. The only exception is trinitrotoluene (TNT), which is filled in both pure and mixed states. Mixed explosives are divided into:

- Phlegmatized,
- Plastic,
- Explosive mixture,
- Thermo stable (insensitive, LOVA (low vulnerability ammunition)).

a. **Phlegmatized explosives:**

(1) **Extruded explosives.** They are phlegmatized by these additives:

- Natural and synthetic waxes,
- Trinitrotoluene,
- Synthetic polymers.

(2) **Cast explosives phlegmatized by trinitrotoluene**:

- Hexolits (RDX+TNT),
- Oktolits (HMX+TNT),
- Pentolits (PENT+TNT),
- Cast explosive mixtures with aluminium:
  - TORPEX: RDX+TNT+Al;
  - HTA-3: HMX+TNR+Al;
  - COMPALEX 15 or 17: RDX+TNT+Al+ Waxes.

(3) **Cast explosives phlegmatized by polymer binder**:

- PBX explosives

b. **Plastic explosives.** Mixed explosives formed from higher brisance explosives and polymers binders. The resulting mixture has a plastic consistency.

(1) **Based on Penthritte or with combination with RDX**:

- Pl-Np-10 (Semtex 10) - Cz (PENT+ binder) dark grey colour,
- Pl-Hx-30 - Cz (RDX + PENT + Al+ binder) grey colour,
- Pl U-EP 14 – Cz (RDX+PENT+ binder) orange colour.
- PRA / HUN,
- PMW – POL,

– NITROLIT / POL.

(2) **Based on RDX:**

– Composition CHc – Cz (RDX+SiO2 + binder) ochre colour,
– PVV/5A – USSR (RDX + binder + mineral oil),
– PVV-7 – USSR (RDX + Al + binder,
– GP/87K (Geksoplast) – USSR (RDX + butylene rubber),
– PP/01 (C4) - Yugoslavia.

c. **Explosive mixture.** There is a broad range of explosive mixtures. These mixtures do not contain a phlegmatizer. The most important group consists of ammonium nitrate explosives. For military purpose the most significant are mainly explosive mixtures of ammonium nitrates with trinitrotoluene. Amatol (TNT + NH4NO3) and ammonal (TNT + NH4NO3 + Al) represent of alternative compensation (not full) in the absence of trinitrotoluene in war times.

d. **Thermo stable and Low vulnerability ammunition (LOVA).** These are sometimes called “insensitive”. These types of explosives must meet the following requirements:

(1) **High thermal stability** for ammunition exposed to heating at supersonic flight, contained in nuclear munitions, and used in space launch vehicles or ballistic missile.

(2) **Low vulnerability** for ammunition, which must be highly resistant to undesirable external stimuli respectively and/or will result in a burning/deflagration reaction rather than detonation when subject to unwanted stimuli.

0109. PYROTECHNIC COMPOSITIONS

1. Pyrotechnic compositions are mechanical mixture of combustibles, oxidants and special ingredients designed to create the desired pyrotechnic effect. Pyrotechnic substances are classified by the pyrotechnics effect they produce:

a. **light for illuminating**, flare, signalling, tracers, etc.,

b. **smoke for camouflage**, signalling, protection, etc.,

c. **ignition,** such as black powder, Mg + BaO2, Zr + PbO2 etc.

d. **time delay** such as black powder, Si + PbO2, Zr + PbO2, etc.

e. **incendiary** such as napalm, thermite, electron pyro gels, phosphorus, etc.,

f. **special composition**, for artificial rain, infra-red decoy, heater composition, gas sources for airbags, inflatable boats, life jackets, pyro-cartridges for catapults, etc.

CHAPTER 2
ARTILLERY AMMUNITION

0201. **CHARACTERISTICS**

1. **Tasks of artillery.** Artillery performs many various roles. It can destroy the enemy's tanks, artillery, aviation, infantry, artillery and many other supporting tasks, such as battlefield illumination, the creation of smoke screens and so on. In order to carry out all of these tasks different types of ammunition are used. The variety of tasks and targets determines many types of shells. The artillery weapons include cannons, howitzers and mortars.

2. **Definition of artillery ammunition.** It is ammunition which is greater than 30 millimetres in calibre and covers all components, which are necessary to fire the weapon once. It is also called a complete round. The complete round is an assemblage of explosive and non-explosive components designed to perform a specific function. The projectile and cartridge case with the propelling charge forms a complete round. Complete rounds are classified by their construction as:

– Fixed;

– Separate loading.

a. **Fixed** (Figure 2.1)**.** It is ammunition, where the cartridge case is **<u>permanently attached</u>** to the projectile. The cartridge case can be made of iron or brass or can be all semi or fully combustible. An advantage of this ammunition type is the high rate of fire that is possible.

Figure 2.1

b. **Separate loading** (Figure 2.2). It is ammunition which is characterized by the arrangement of propelling charge and projectile for a single loading. The projectile and propelling charges are loaded into the gun separately. The propelling charges are semi combustible or fully combustible cartridge. The fully combustible cartridges are also called bagged cartridge or modular propellant charge (Figure 2.2). Separate loading ammunition can also be produced as semi fixed as metal cased (Figure 2.3), The separate loading ammunition advantage is the ability to regulate the amount of propelling

charge bags based on range of fire. The disadvantage is the reduced rate of fire due to longer loading times.

Figure 2.2

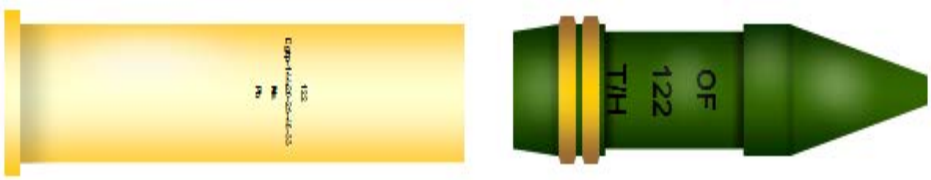


Figure 2.3

3. **Construction of complete round.** Complete round consists of:

- Projectile;
- Cartridge.

a. **Projectile** consists of:

- Body;
- Bursting (main) charge (depends on projectile role);
- Fuze.

b. **Cartridge** consists of:

- Cartridge case;
- Propellant;
- Accessories of propellant;
- Primer screw with primer.

0202. **CLASIFICATION OF AMMUNITION**

1. FWP ammunition is divided mainly by their role to:

a. Basic designation;
b. Support designation;
c. Special designation.

0203. **BASIC AMMUNITION**

1. **Basic ammunition** is designed to accomplish combat tasks; destroying enemy forces, means, equipment and resources.

a. **Fragmentation** (FRAG);
b. **High-explosive** (HE);
c. **Armour piercing** (AP):

- AP with solid projectile (without explosive filler);
- APHE with explosive filler;
- APC, APC-BC Caped with Makarov's cap or Ballistic cap, and with or without explosive filler;
- AP with Hard core, and with or without explosive filler;
- AP with discarding sabot;
- HEAT with Hollow charge;
- HESH with Squash head;

d. **Concrete piercing** (CP);
e. **High-explosive anti-personnel** (HEAP)

- Shrapnel,

f. **Incendiary.**
g. **Chemical.**
h. **Biological.**
i. **Radiological.**
j. **Nuclear.**
k. **Combination:**

- HE/FRAG;
- HE/AP/incendiary;
- HEAT/FRAG;
- HE/FRAG/Incendiary;
- FRAG/CBRN;
- FRAG/Smoke and so on.

0204. **SUPORTING AMMUNITION**

1. **Supporting ammunition** to provide direct support of combat tasks:

a. **Smoke** to mask own forces.
b. **Illumination** to illuminate battlefield.
c. **Signal** for signalling during night and day.
d. **Orientation** to mark a relevant point on the ground.
e. **Targeting** to ensure accurate shooting.
f. **Propaganda** to deliver leaflet, flyer and other propaganda material.
g. **Tracing** to trace trajectory and placement of shots.
h. **Intrusive** for jamming of radar, radio communication, infrared guidance and control methods.

0205. **SPECIAL AMMUNITION**

1**.** **Special ammunition** for non - combat use:

a. **Practice ammunition** for training shooting and tactical exercises, can be without explosives or with reduced filler,
b. **Inert, drill** ammunition to training in weapons handling without explosives,
c. **Substitute ammunition** to life of the weapon shooting, testing of weapons, acceptance tests weapons at the purchasing,
d. **Test ammunition** used by manufacturing facilities to verification of production precision, especially explosive filler. It is the same as the live ammunition.

GUN PROJECTILES

0206. **CONSTRUCTION OF PROJECTILE.**

1. **Definition of projectile.** A projectile is an object, projected by an applied exterior force and continuing in motion by virtue of its own inertia, such as a bullet, shell, or grenade. The projectile is primarily designed to destroy targets.

2. The primary projectile of any artillery gun/howitzer weapon system is the HE projectile. It is filled with high explosives and is designed to inflict casualties through fragmentation or damage through impact with the target. A solid projectile without explosives filler destroys targets through kinetic energy.

3. In addition to the primary HE projectile there is a number of different types of projectiles known as carrier projectiles. The carrier projectile differs from the HE projectile; it plays little or no part in defeating the target. Carrier projectiles are varied and are used to carry anyone of a number of contents, each having a specific purpose.

4. **Basic construction characteristics**. The ammunition is characterized by its:

a. Calibre,
b. Weight,
c. Outer shape,
d. Internal organization.

5. **Construction** of artillery ammunition (Figure 2.4). Artillery ammunition consists of:

a. **Pointed head** in the shape of ogive. The ogive is the curved portion that streamlines the front of the projectile and reduces nose resistance. On the pointed head is:

– **Shoulder**. On the pointed head is a shoulder. The shoulder is the point where the ogive meets the bourrelet.

b. **Body** is the major portion of the projectile in the cylindrical shape. Specific parts of the body are:

– **Bourellet**. The bourrelet is a carefully machined portion immediately in rear of the shoulder that rides on the lands of the barrel. It centres the projectile in the bore and prevents wobbling in the barrel.
– **Driving band**. This is a band of metal or plastic that engraves into the lands and grooves of the barrel and imparts spin to the projectile.

c. **Base.** The base is the part in rear of the driving band. It can either be tapered (boat-tail), square base or hollow base. There on the base is:

– **Base Cover and Base Plug.** The base cover is welded to the base of HE projectiles to prevent hot gases entering through tiny cracks or pores. A base plug is used in base ejection projectiles so the contents can be expelled. It may be connected to the projectile by threads, shear pins, twist pins or a combination of these.

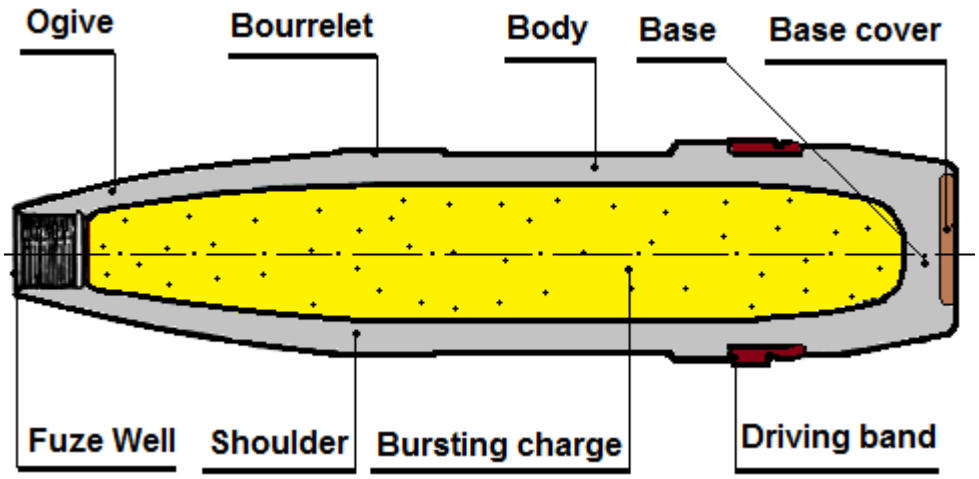


Figure 2.4

0207. **CLASSIFICATION OF PROJECTILE.** Artillery projectile are classified on different point of view:

– Intended use,
– Type of stabilization
– Calibre,
– Calibre projectile to calibre barrel ratio,
– Shape of projectile.

1. **Intend to use.** Artillery projectile are classified according to using intention as follows:

– Basic,

– Support,
– Special.

a. **Basic.** Basic projectiles are designed to accomplish combat tasks; destroying enemy forces, means, equipment and resources:

Type of projectile English/Russian	USSR	CS	POL	RO	HUN
Fragmentation/Oskolochnyj	“O”	“O”	“O”	“O”	“O”
High explosive/ Fugasnyj	“Ф”	“F”	“F”	“F”	“F”
Fragmentation-high explosive/ Oskolochno- Fugasnyj	“OФ”	“OF”	“OF”	“OF”	“OF”
Concrete piercing-Betonobojnyj	“Г”	“B”	“G”	“G”	“G”
Armour piercing capped/ Bronebojnyj	“Б”	“P”	“B”	“B”	“B”
Armour piercing, tracer/ Bronebojnyj trassirujushtchij	“БР”	“PSv”	“BR”	“BR”	“BR”
Armour piercing, discarding sabot/ Bronebojnyj podkalibernyj	“БМ”	“Pp”	“BM”	“BM”	“BM”
Armour piercing, solid shot	“СП”				
HEAT fin stabilized (Shaped)/ Bronebojnyj kumulativnyj	“БК”	“Pr”	“BK”	“BK”	“BK”
Chemical, gas/Gazovoj	“Г”	“Ch”			-
Incendiary/Zažigatelnyj	“З”	“Z”	“Z”	“Z”	“Z”
Shrapnel/Shrapnel	“Ш”	“Š”			-

b. **Support.** Support projectiles serve to fulfil support tasks such as smoke screening, lighting and delivery of propaganda. There are not intended to direct destruction:

Type of projectile	USSR	CS	POL	RO	HUN
Smoke/ Dymovyj	“Д”	“D”	“D”	“D”	“D”
Propaganda/Agitacionnyj	A	A	“A”	“A”	
Illumination/Svetjashtchij	C	Os	„S“	„S“	

c. **Special.** Special shots are not for combat use, they are used for training, tactical exercises and various ballistic tests.

Type of projectile	USSR	CS	POL	RO	HUN
Practice	ПРАКТ	Cv	TRENINGOVY	P(REAL)	GYAKORLO
Inert, drill, dummy, blank	ІНЕРТ, МАКЕТ	Šk	SZKOLNY	DE EXERCITIU INERT	OKTAKO
Substitute		Nh			

2. **Stabilization**. Projectiles are stabilized by two basic ways:

a. **Spin stabilized.** Projectiles are stabilized by rotation and are fitted with driving or rotating band. Spinning a projectile promotes flight stability. Spinning is obtained by firing the projectiles through a rifled tube.

b. **Fin stabilized**. These projectiles obtain stability through the use of fins located at the rear end of the projectile. Normally, four to six fins are employed. Fin stabilized projectile is fired from smooth - bore (unrifled) barrel Fin-stabilized projectiles are very often sub-calibre.

3. **Calibre**. Calibre is the diameter of a smooth bored weapon and distance between opposing lands of a barrel. The projectiles are divided according to the calibre as follows:

a. Small-calibre bullets up to calibre 75 mm,
b. Medium calibre projectiles from 76 mm to 152 mm,
c. Large-calibre bullets above 152 mm.

4. **Calibre projectile to calibre barrel ratio**. According to the ratio of the barrel calibre of projectiles calibre projectiles divided into:

a**. Calibre**, calibres round is consistent with the calibre barrel,
b. **Out of calibre** :

– Sub-calibre, a reduced round designed to operate from a large calibre weapon using a sabot or adapter,
– Above calibre, a larger calibre projectile than the calibre of the barrel.

5. **Shape of projectile**.

a. Long-range projectiles are having an overall length of the projectile 4.5 to 5.5 diameter (d),
b. Short-range projectiles are having an overall length of the projectile up to 4 times diameter (d).

BASIC PROJECTILES

0208. FRAGMENTATION PROJECTILES

1. **Characteristics** (Figure 2.5). The role of fragmentation projectiles is to destroy the manpower, firepower of enemy, combat equipment, air targets and other materiel by the effects of fragments which arising from the metal body of the projectiles after their explosion. Combat value of fragmentation projectiles depends on the amount of active fragments and the space that these shrapnel hit.

a. **Construction**

(1) **The body** projectiles are made of steel or cast steel, usually in one piece. Wall thickness is 1/4 - 1/8 diameter (d). The shape of the body is designed as a long-range projectile. Smaller calibres have an extended rear part of body to create more fragments.

(2) **Blasting charge.** Fragmentation projectiles have a greater wall thickness of the body and therefore lower coefficient of filling alpha. (α = 5 to 15% - weight ratio of the bursting charge to the total weight of the projectile in %). The bursting charge is normally used TNT. Some projectiles are filled with Composition B or RDX / Al.

(3) **Fuzes.** To achieve fragmentation effect is best to use the impact super-quick point detonating fuze. Ricochet fire can be used with fixed delay fuzes. For fragmentation projectiles against an aircraft a timer or proximity fuze can be used.

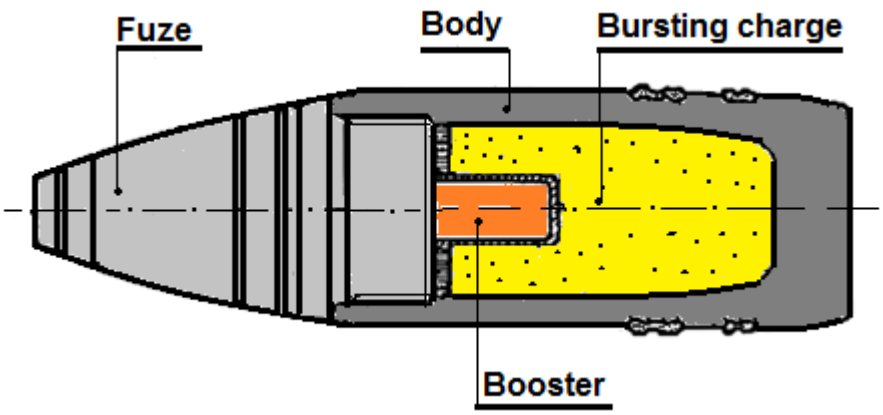


Figure 2.5

b. **The effect of projectile** on the target depends on:

(1) **The number of active fragments**. An effective fragment against personnel is considered to have a fragment weight of 5 grams, against air targets the effective fragment weight is 20 to 25 grams. The amount of fragments depends on the size of calibre:

- Calibres of 85 mm - 200 to 250 pieces;
- Calibres of 122 mm - 400 to 500 pieces.

(2) **The distribution of fragments.** The head of the projectile produces from 15 to 20% fragments. The cylindrical body creates already 60 to 70% and rear part from 5 to 10%. Distribution is strongly affected by the angle of impact of the projectile and when the fuze operates.

(3) **The depth of the crater.** After the impact of projectile on the ground, a crater is created, which influences the fragmentation effect. The greatest effect of fragmentation is at depth of crater about 20 to 25 cm. If the depth of crater increases to 35 to 40 cm, the effect is halved. If a depth of crater is 50 cm (in the mud and snow), the effect of projectile is minimal.

0209. HIGH EXPLOSIVE PROJECTILES

1. **Characteristics**. The purpose of high explosive projectiles is to destroy structures, buildings, shelters, and various obstacles by the effects of a pressure wave after the explosion. The main requirement is the construction of an explosive projectile that contains the largest quantity of explosives; fragmentation effect is secondary. The size of blasting charge is influence mainly by the calibre of the projectile; in terms of explosive effect large calibres are preferred (above 120 mm) (Figure 2.6).

a. **Construction**

(1) **The body** projectile is made of steel, usually in one piece. Wall thickness of cannon projectiles is 1/6 - 1/8 diameter and 1/8 – 1/15 for howitzer projectiles. The shape of the body is designed to be a long-range projectile. The projectile may or may not be equipped with tracer.

(2) **Blasting charge**. Explosive projectiles have thinner walls and therefore a greater coefficient of filling alpha - it is from 10 to 20%. Bursting charge is mainly from TNT. In wartime Amatol is also used.

(3) **Fuze.** It is best to use an impact point detonating fuze (PD) with delay (0.1 to 0.2 s), so that the explosion occurred after the projectile penetrates the target.

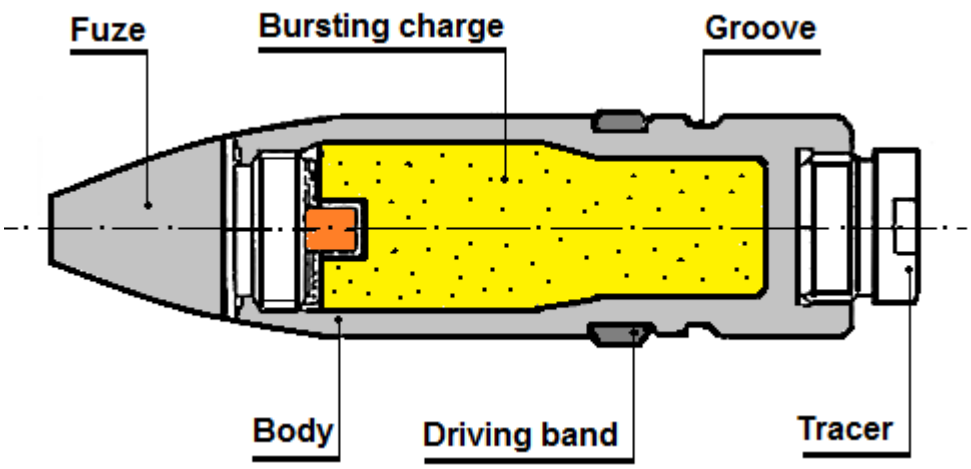


Figure 2.6

b. **Effect.** The effect of projectile on target depends on:

(1) **The weight of the projectile and the type of explosives**. Larger projectiles contain more explosives. One kilogram of trinitrotoluene excavates approximately 2 to 2.5 cubic meters of moderate soil.

(2) **The depth of penetration projectile**. The explosion of projectile too deep in the target can lead to a reduction of explosive effect, whereas too little depth does not fully exploit the energy of explosives.

(3) **The physical characteristics of soil.** The table shows the effect of high explosive projectiles in moderate soil with optimum depth of penetration.

Calibre	Diameter of crater in metres	Depth of crater in metres
85 mm	1.25 – 1.5	0.5- 0.7
122 mm	2 – 2.5	0.8 – 1
152 mm	3 – 3.5	1.2 –1.5

0210. **FRAGMENTATION - HIGH EXPLOSIVE PROJECTILES**

1. **Characteristics.** The purpose of these projectiles is to combine the effect of fragmentation projectiles and high explosive projectiles into one projectile. According to the target, the fuze is set to the desired effect. Fragmentation - high explosive projectile are medium and large calibres. The strength of walls is about 1/6 to 1/8 of calibre and the coefficient alpha is about from 10 to 15% TNT. These projectiles use an impact fuze with delay. Setting the fuze to the immediate action, fragmentation effect is achieved. Setting the fuze to time delay, high explosive effect is achieved. Projectiles up to 122 mm calibre dominate fragmentation effect. Calibres above 122 mm dominate high explosive effect.

0211. **ARMOUR PIERCING**

1. **Armour piercing – solid projectile** (Figure 2.7). The small calibres are not large enough to carry an effective explosive charge, so it is filled with hard inert solid material.

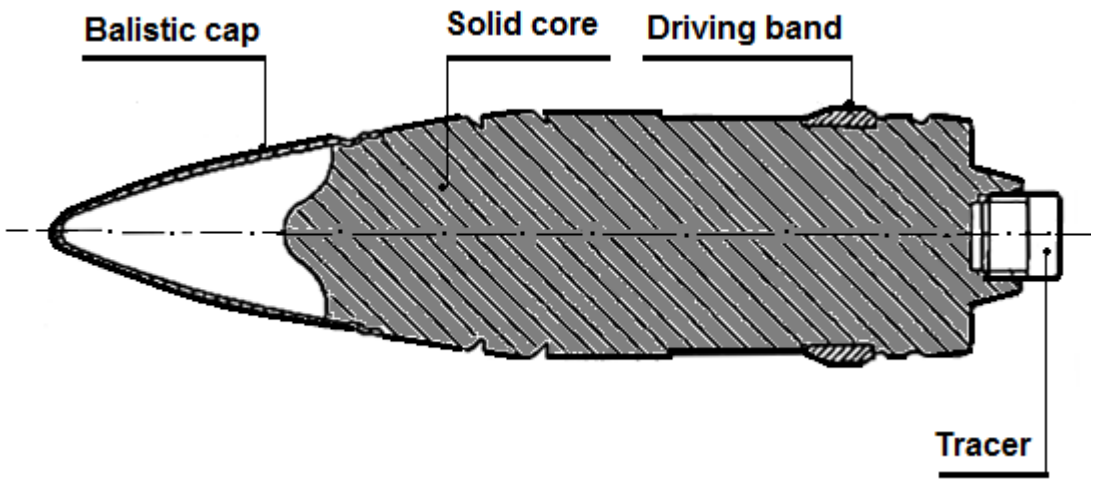


Figure 2.7

2. **Armour piercing high explosive projectile** (Figure 2.8). The purpose of armour piercing projectiles are to destroy equipment protected by armour plate

such as tanks, personal armour carriers, vessels and other shelters protected with armour plate. The construction of projectile allows penetration through armour targets by kinetic energy and attacking crew by residual kinetic energy or fragments from punctured hole or detonating bursting charge.

a. **Construction.**

(1) **The body** of projectile is made of refined hardened steel with a small cavity containing a high explosive. Hardness of the material decreases from front part to the bottom of projectile. Wall thickness of projectile is 1/3 - 1/5 of diameter. A tracer that is used to indicate the trajectory of the projectile is attached to the bottom. At the ogive in front of the body (Makarov) cap may be attached (Figure 2.8). After the impact on the target, Makarov's cap disrupts cementation of the armour and reduces the chance of the projectile ricocheting. The Makarov's cap protects the brittle front part of the body when striking armour plate against breakage. To reduce air resistance in flight, to the cap is attached a ballistic cap (Wind shield).

(2) **Blasting charge.** An armour piercing projectile's bursting charge is normally from insensitive RDX (H10) or A-IX-1.

(3) **Fuze.** The fuze is initiated by impact on the target. The inertial forces on the fuze that caused by the impact serve to initate the fuze.

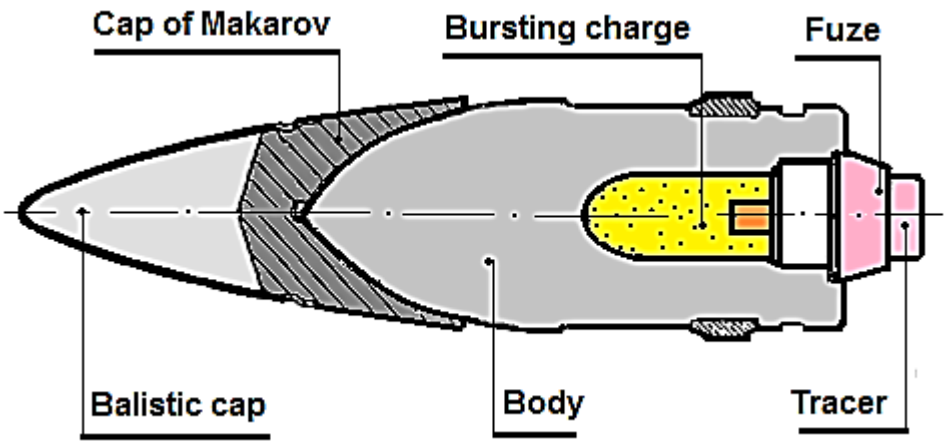


Figure 2.8

b. **Effect**. The effect of projectile on the target depends on:

– **Impact energy.** Impact energy of the projectiles at the moment of impact to the target,
– **Angle of the impact.** The best angle is 60 degrees. The smaller angle means reduction in the efficiency penetration, due to a greater strain on the projectile body,
– **Destructive effect.** Destructive effects of projectiles after their passing through the armour depend on mass of fragments and type of explosives.

3. **Armour piercing with recess** (Figure 2.9). There are two recesses next to the bourrelet which directs the consistent splitting of the front projectile part, after the projectile hits a target. The projectile has edgeless nose which prevents the projectile from ricocheting.

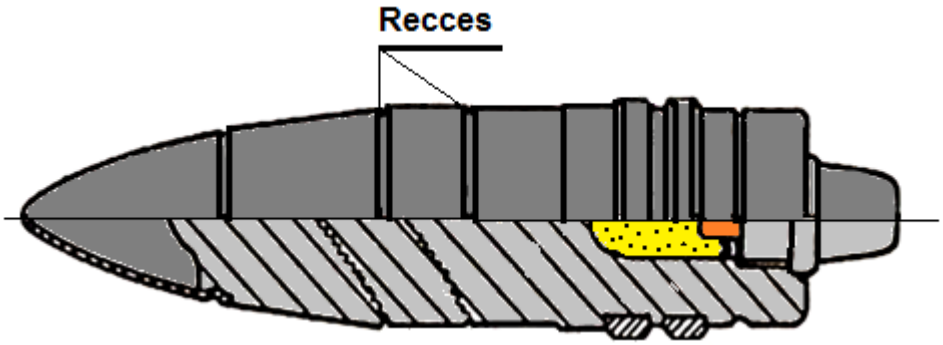


Figure 2.9

4. **Armour piercing discarding sabot** (Figure 2.10). This projectile is designed to destroy armoured tanks and armour personnel carriers by the heavy and hard core that penetrates armour via own high kinetic energy.

a. **Construction.** The body of projectile consists of a hard core and sabot.

(1) **Hard core.** There are explosive or fuze present. The core has a smaller diameter than the calibre of gun. The core of the projectile is made of tungsten carbide, titanium, molybdenum or depleted uranium with a hardness of 80 to 120 Rockwell. The core must not only be hard but also tough and have a high bending strength.

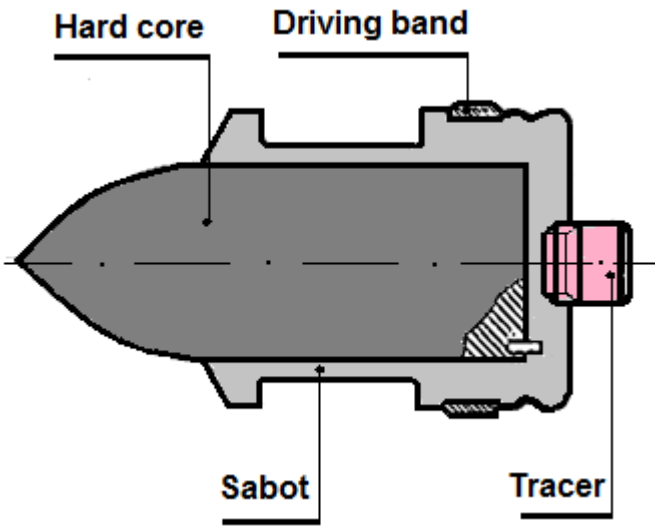


Figure 2.10

(2) **The sabot**. Sabot is released from the core when striking armour or during flight by the centrifugal forces or air resistance. The sabot can have various shapes. Basic shapes of sabot and way of their releasing is described on the Figure 2.11.

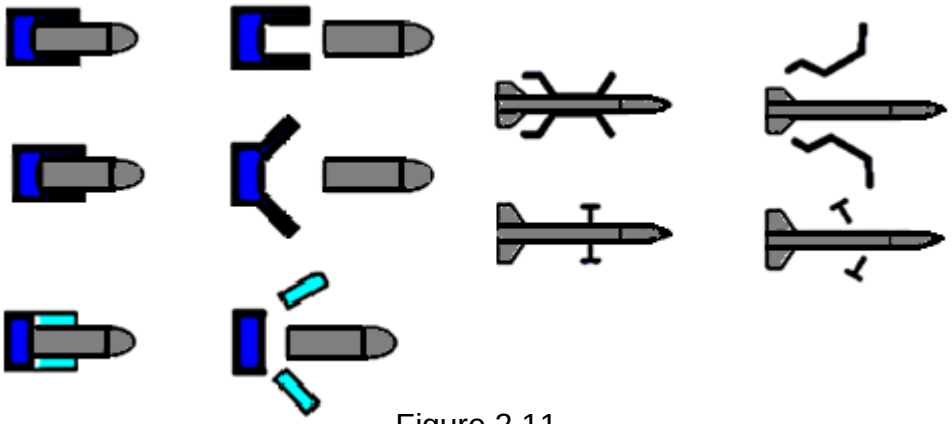


Figure 2.11

The disadvantage of Armour piercing discarding sabot (APDS) is the possibility of harming friendly units by fragments from the sabot at a distance of 50 m from the muzzle.

5. **High explosive anti-tank**. The HEAT projectile uses the Hollow (shaped) charge effect. The HEAT projectile does not penetrate armour via kinetic energy but by the effect of a shaped charge. This called Munroe or Newman effect. When a liner is used the effect is termed Mohaupt effect. The effect does not depend on projectile velocity but projectile rotation significantly reduces the effect. The crew is destroyed by the pressure wave of the hot gas jet and the debris of penetrated armour. These pieces of metal fly with great velocity around the inside of the tank, killing personnel and detonating ammunition and explosives. The penetration achieved by a HEAT projectile is quite spectacular and (in terms of weight of HEs used) small charges can penetrate considerable thicknesses of plate.

a. **Construction.**

(1) **The body** of projectile is made of steel or cast steel. Overall length of the body is from 3 to 3.5 diameters and at the new types up to 4.5 diameters. In front of the body is usually ballistic cap (Stand-off spike with fuze), which takes the function of distance tube. Hollow space has the conical shape with angle of 30 to 40 degrees and there is an insert which is made of steel or copper. From hollow space to detonator leads spit-back tube. Through this tube, the detonating impulse is transmitted from the point of initiation to a detonator at the base of explosive charge. The stabilization of projectile is by spin or fin.

– **Spin stabilized HEAT projectile.** Directional stability of the projectile is given by the action of gyroscopic forces which result from spinning of the body about its axis of symmetry (Figure 2.12).

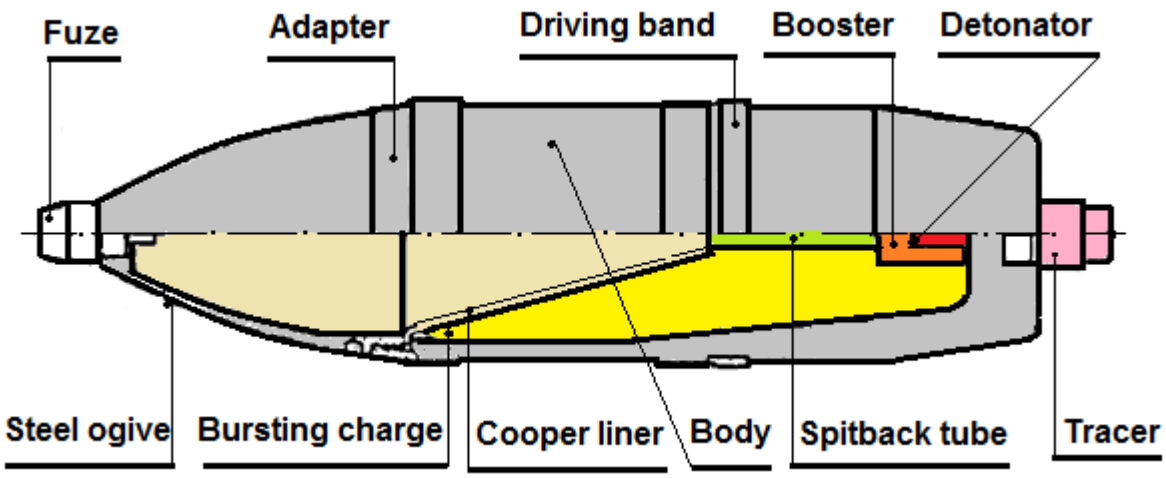


Figure 2.12

– **Fin stabilized HEAT projectile.** Modern projectiles are fin stabilized and use a distance tube (standoff spike) instead of a ballistic cap for standoff distance. Directional stability of the projectile during the flight by the use aerodynamic protruding fins (Figure 2.13).

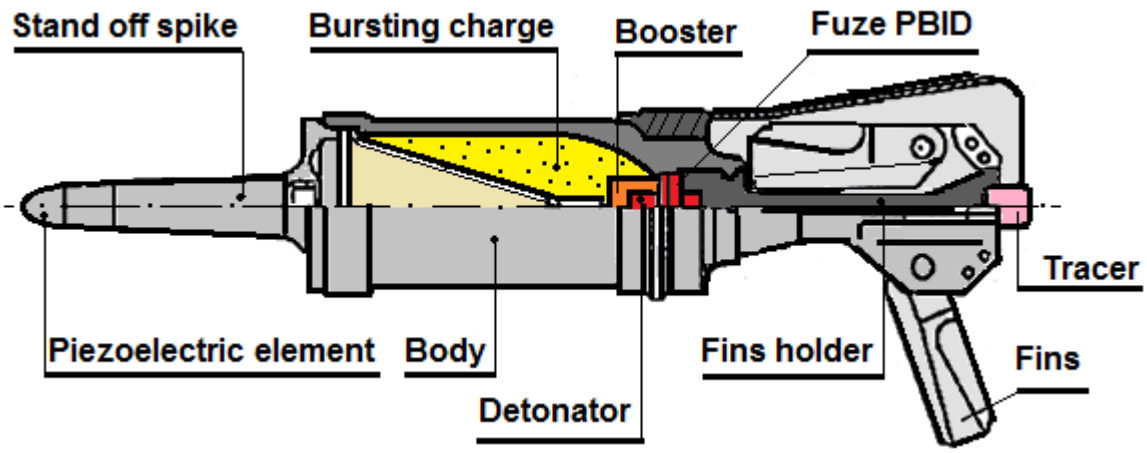


Figure 2.13

(2) **Blasting charge.** The hollow charge effect is dependent on the type of explosives used. Hollow charges use powerful explosives or their mixtures. Usually it will be T / RDX ratio of 50:50, RDX / T ratio of 60: 40 or A-IX-1 and A-IX-2, which are mixtures of RDX. The length of bursting charges is 2.9 to 3.1 of diameter and the coefficient of filling alpha = 10 to 17%.

(3) **Fuze.** HEAT projectile used instantaneously, impact, nose fuze. The current types of HEAT projectiles use fuze with the piezoelectric effect, point initiating base detonation (PIBD).

b. **Effect.** The effect of projectile in the target depends on:

– Type of bursting charge,
– Diameter of charge

– Length of charge
– Method of initiation,
– Materials, shapes and designs of shaped charge liner,
– Stabilization of the projectile / spin or fin stabilization /,
– Length of stand-off spice.

6. **High explosive squash head "HESH"** (Figure 2.14).High explosive squash head projectile sometimes called high explosive plastic (HEP). The effect of the projectile is different from the AP or HEAT projectiles. They have a great weight of explosive charge and can cause high explosive and fragmentation effect; due to this they can be used in an armour piercing or fragmentation role. Upon impact the front part of shell walls collapse and the inert filling in the nose absorbs the shock allowing the plasticized HE to spread against the target. When this occurs, the base detonating fuze activates detonator and booster detonating the plasticized HE. The very powerful shock wave caused by the detonation passes through the armour until it reaches the inner surface where, because it cannot cross the air gap presented reverses itself and travels back through the armour. This has the effect of ripping up the inside of the armour (spalling) that killed the crew. Thin armour may be completely penetrated resulting in a plug (scab) of armour entering the vehicle.

a. **Construction.**

(1) **The body** of projectile is made of steel and in front part is a thin wall.

(2) **Blasting charge**. They have a high weight of explosive charge and can cause high explosive and fragmentation effect. Explosive usually it will be RDX/WX 8/1 in ratio of 88% RDX and 12% WAX 8.

(3) **Fuze**. Fuze is impact, instantaneously, base detonating.

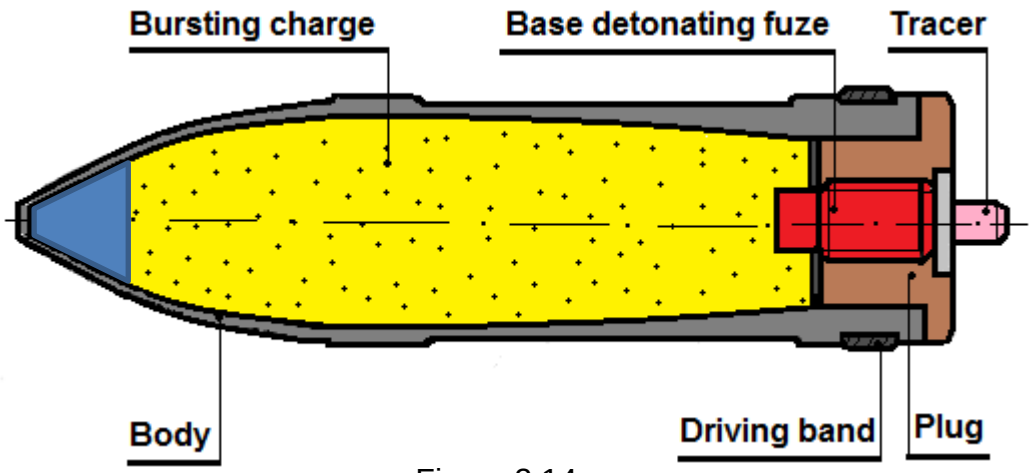


Figure 2.14

HEAT and HESH/HEP projectiles are effectives in defeating concrete and other hard targets.

7. **Concrete piercing projectile.** The purpose is to destroy concrete fortification, reinforced concrete bunkers and buildings. Concrete piercing projectile, if necessary, can be used as antitank projectile. In order to break through the target, is used kinetic

energy and pressure of gas explosion. It must first perforate the concrete wall, penetrate inside and then detonate its' bursting charge.

a. **Construction**.

(1) **Body.** The body of projectile is made of heat-treated hardened steel. It consists of the body, screwed bottom and ballistic cap.

(2) **Blasting charge** is made from pressed TNT segments suffused with paraffin. Front of the cavity filled with wooden or leather material to decrease main charge stress during the impact. Coefficient of filling alpha = 17 to 18 %. The length of TNT segments cannot extend the 1.5 multiple of its diameter.

(3) **Fuze.** Fuze is impact, base detonating with time delay

b. **Effect.** The effect of projectile in the target depends on:

- Size of calibre,
- Impact energy,
- Angle of the impact,
- Amount of bursting charge,
- Mechanical characterization of the shell body.

Example: Effect of concrete piercing projectiles calibre 152 mm is up to 1.2 m.

0212. HIGH-EXPLOSIVE ANTI-PERSONNEL (HEAP) PROJECTILES

1**.** **Shrapnel** (Figure 2.15). HEAP destroys infantry by small lead or steel balls that are ejected from the shell body by the expelling charge. The functioning and principles of shrapnel shells are fundamentally different from fragmentation high-explosive shell. Shrapnel shell was now replaced by a fragmentation high explosive shell, because manufacturing shrapnel ammunition is very expensive.

a. **Construction**

(1) **Body.** The body of projectile is made of steel with adapter. It consists of the body, transition tube to initiating charge at the bottom part of the body.

(2) **Expelling charge** is made from black powder or other low explosive designed for a nose ejection projectile for the purpose of ejecting contents (ball or needles of 0.5 g of weight).

(3) **Fuze.** Fuze is impact, point detonating (PD) with time delay.

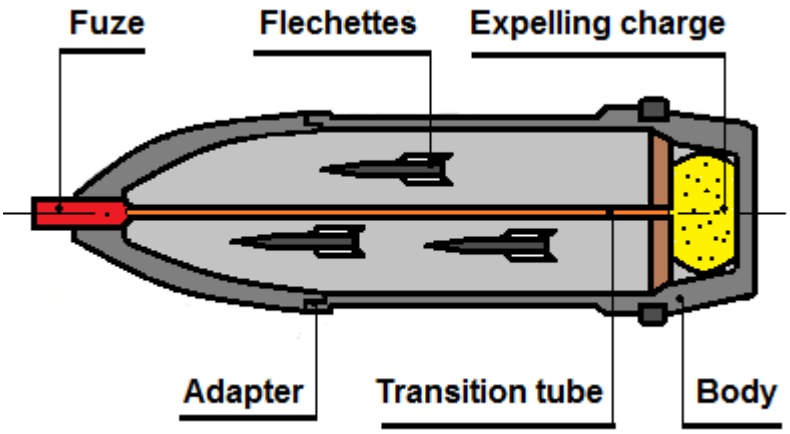


Figure 2.15

0213. INCENDIARY PROJECTILES

1. **Characteristics.** Incendiary ammunition is a type of ammunition that contains a flammable compound that burns rapidly and causes fires. Incendiary projectile destroy by fire enemy facilities, equipment, supplies, and personnel. They can be combined with shrapnel to make it more difficult fire fighting. According to the construction divides the incendiary projectiles into bursting or ejection (Figure 2.16).

a. **Construction of incendiary projectiles with bursting case**

1) **Body.** The body of projectile is made of steel with adapter and contains incendiary segments and blasting case. Adapter allows inserting additional elements into the body. The material of body must have considerable strength because the walls must be thin and allow the filling of as much of the incendiary substance as possible. Therefore, we use a steel wall of thickness from 1/8 to 1/15 diameters. Incendiary segments contain flammable material and ignition compound in steel packaging.

2) **Bursting charge**. Bursting case is filled with TNT or plastic explosive. Bursting case is under the adapter. Coefficient of filing alpha is 3%.

3) **Incendiary filler**. The most frequently fillers are thermite, elektron (a magnesium alloy), phosphorus, alkaline metals and other combustibles. The coefficient alpha is 10 - 15%.

4) **Fuze.** Fuze is impact, instantaneously, point detonating.

b. **Construction of ejection incendiary projectiles**

(1) **Body**. The body of projectile is made of steel with adapter and contains incendiary segments and expelling case with expelling charge. Adapter allows inserting additional elements into the body.

(2) **Expelling charge**. Expelling case with expelling charge is placed on the top part of the projectile and is made from black powder or other low explosive. Ignited train goes from fuze, to expelling charge during the transition tube. The gas pressure of explosion projects the incendiary segments from the base of the projectile.

(3) **Incendiary filler**. Flammable material is loaded in metal segments in three layers. The metal segments are ejected from the shell. Each segment is divided into four layers. The layers are ignited by quick-match after a time delay The incendiary material gets into wood or other building and starts a fire.

(4) **Fuze.** For this type of projectile are used double three rings nose fuze.

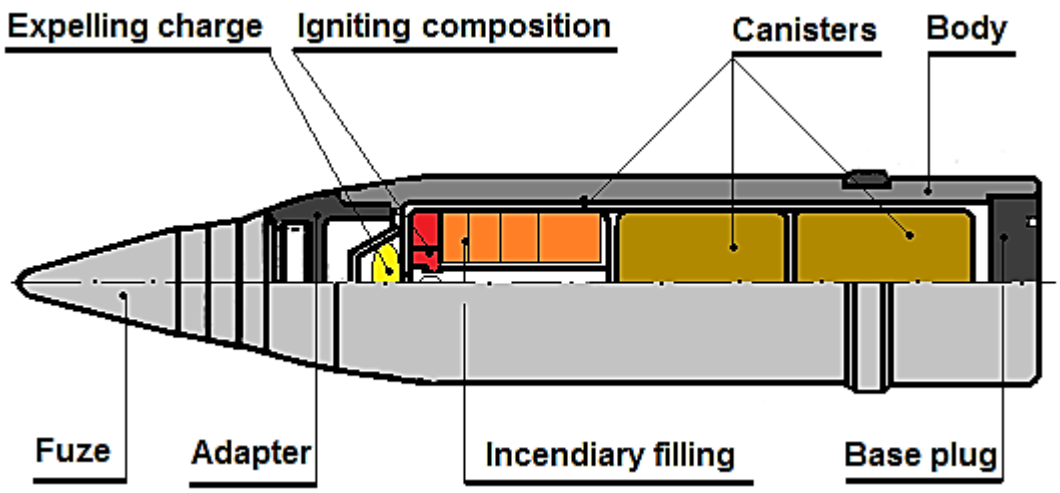


Figure 2.16 (Ejection Incendiary Projectile)

0214. **CHEMICAL PROJECTILES**

1. **Characteristics.** Destroy infantry the use of chemical warfare agents which are released to environment by opening the projectile body. The body is opened by a small bursting charge. The use of chemical weapons is prohibited by international agreements (Figure 2.17).

a. **Construction**

(1) **Body.** The material of body must have considerable strength because the walls must be thin to allow filling as much chemical warfare agent as possible. Therefore it is made of steel and the strength of the walls varies between 1/8 to 1/15 diameters.

(2) **Bursting charge.** Inside the body is a bursting case with a bursting charge to open the body of the projectile and release chemical warfare agent. Coefficient alpha is 3%. Bursting charge is made from TNT or plastic explosive Np10.

(3) **Chemical warfare filler**. The filler is made of various types of chemical warfare agents. They can be divided into two basic types, according to the effect of:
- Volatile - short duration of action
- Stable - durations of up to several days.
- Coefficient of filling alpha is 10 - 15%. Content cavity due to the potential thermal expansion of chemicals is filled with to only 80 - 90%.

(4) **Fuze.** Fuze is impact, instantaneously, point detonating (PB) with a perfect seal so as to prevent leakage of chemical warfare (CW) agents.

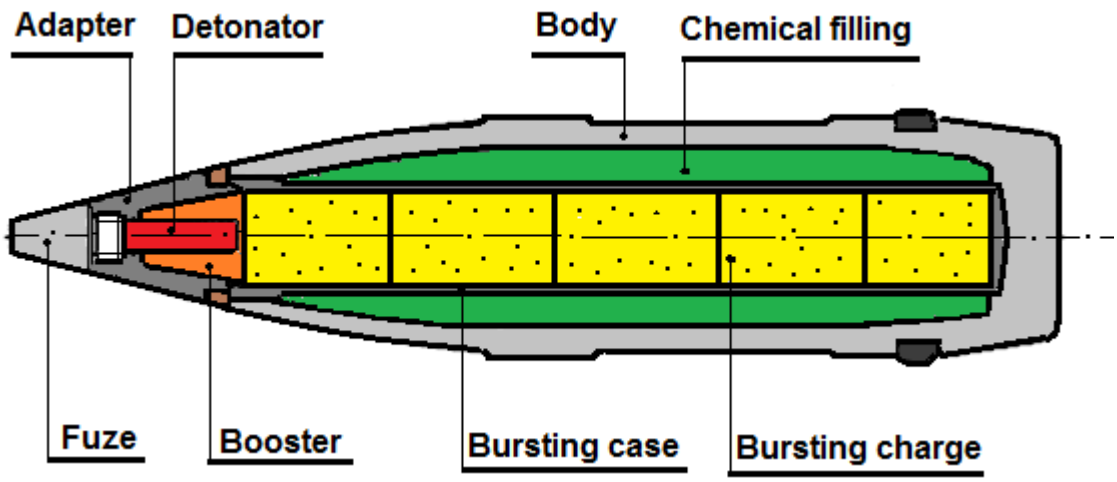


Figure 2.17

b. **Effect**. The effect of projectile in the target depends on:

(1) **Calibre projectiles**. The chemical projectiles require achieving effective concentration of CW agents in the shortest time. Small calibre projectiles are largely ineffective due to small payloads. Large calibres weapons have a slow rate of fire. 85-152 mm are the preferred calibres.

(2) **Type and quantity** of chemical warfare agents. Chemical warfare should meet at least the following requirements:
- High efficiency even in low concentrations;
- Chemical stability in the packing material;
- Chemical stability against heat in a burst of projectiles and moisture in the environment;
- Ease of production and availability of production materials.

(3) **Terrain and weather conditions**. Chemical projectiles are filled with a chemical agent when ready to use. Their lifetime is relatively low. They are divided according to their stability:
- Volatile, stable up to 30 min (phosgene);
- Semi-stable, in the range of hours (diphosgene);
- Stable in the range of several days (mustard gas).

0215. **BIOLOGICAL PROJECTILES**

1. **Characteristic**. From a structural point of view are like incendiary projectiles. Instead of the flammable substance they are loaded with infected insects or infectious material.

0216**. RADIOLOGICAL PROJECTILES**

1. **Characteristics.** Projectiles of this type, in terms of design, are identical with chemical projectiles. They are filled by liquid or powder material (example used oil, kaolin, gypsum) containing radioactive material that emits beta or gamma radiation. The effect of radiation is invisible. It can be detect only by radiation measuring devices. In a short time can contaminate large areas. The disadvantage is the difficult filling and delayed effects.

0217. **NUCLEAR PROJECTILES**

1. **Characteristic.** They are based on the nuclear reactions of various elements, for example plutonium. It consists of body, protective cover, nuclear charge and firing circuit. The outer shape is similar to other projectiles.

Until the moment of explosion, the nuclear charge is divided into two subcritical masses. The initiation device causes the two masses to come together and form a critical mass (Figure 2.18).

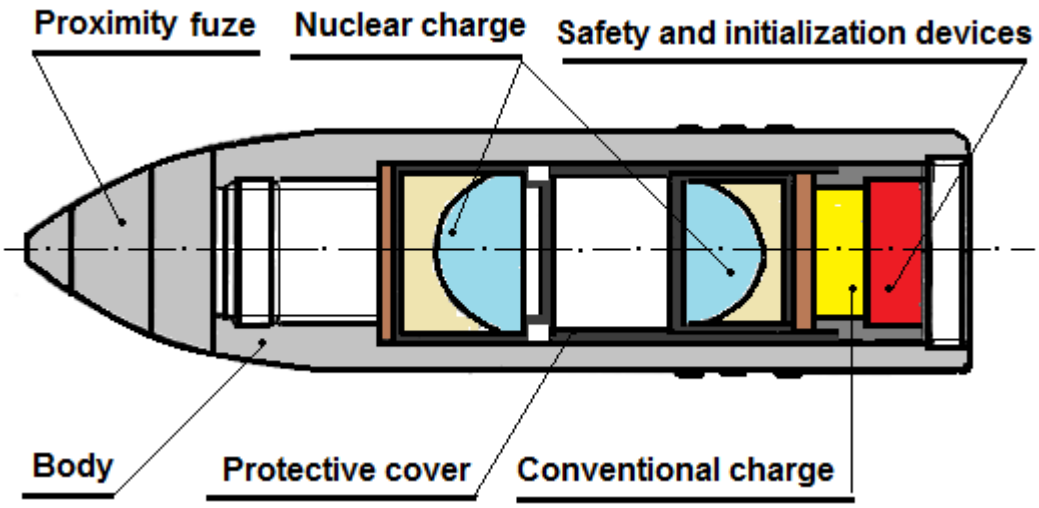


Figure 2.18

SUPORTING PROJECTILES

0218. SMOKE PROJECTILES

1. **Characteristics.** The purpose is to prevent or at least make it more difficult enemy observation, and to reduce the effect of enemy fire. Smoke projectiles can be used also for marking targets to assist in rangefinding. The basic requirement is to create a smokescreen.

a. Construction.

(1) **Body.** The material of body must have considerable strength because the walls must be thin and allow filling of as much of the smoke agent as possible. Therefore it is made of steel and the strength of the walls varies between 1/5 to 1/15 diameters. It is similarly to chemical projectile.

(2) **Bursting charge**. Inside the body is placed a bursting case with a bursting charge to open the body of projectile and release the smoke agent. The coefficient alpha is 3%. The bursting charge is made from TNT or plastic explosive Np10.

(3) **Smoke filler.** Most commonly used smoke agents are chemical compounds that burn, or oxidize on conact with air and produce a smoke screen in the form of fog or smoke. The most widely used are smoke-producing substance are:

- **White phosphorus** smoke has the highest masking ability. Small particles of phosphorus dispersed during an internal explosion in the air immediately catch fire and burn. This creates a dense white smoke of phosphorus oxide, which rapidly reacts with atmospheric moisture, which increases the masking ability of smoke.
  Phosphorus burns for 10 - 12 min. A secondary effect of smoke ammunition with white phosphorus is the effect on vegetation and skin and toxic effects on the respiratory organs.

- **Chlorine sulfonic acid** is easy to manufacture it and raw materials are readily availability. Upon contact with atmospheric humidity the dispersed acid smokes heavily; the masking ability increases with rising moisture in the atmosphere.
  The disadvantage is the large chemical aggressiveness (corrosively) of smoke.

0219. ILLUMINATION PROJECTILES

1. **Characteristics.** The purpose of illumination projectiles is to illuminate the battlefield.

a. **Construction.**

(1) **Body**. Illuminating projectile construction is similarly to a shrapnel projectile. It consists of adapter and a removable bottom, which is secured to the body by a short, fine thread. The body is made of steel, where the thickness of the wall varies from 1/6 to 1/8 diameters. There is a threaded adapter in the nose for screwing fuze in.

(2) **Expelling charge**. Under the fuze is located an expelling case with expelling charge and a flare case with attached a parachute. The expelling charge is made from black powder or other low explosive.

(3) **Filler.** Illumination compound is made from a mechanical mixture of flammable material, oxidizer and deterrents to slow the burning rate. For example, the illumination compound can consist of 66% of barium nitrate, 30% magnesium and 4% iditol or shellac.

(4) **Fuze.** Fuze is double, point detonating with three rings.

NOTE: Some other types of projectile have the same or similar construction as an illumination projectile, for example:

– **Signal** for signalling during the night and day;

– **Orientation** to marking relevant point on the ground;

– **Tracing** to trace the trajectory and place of shooting;

– **Intrusive** for jamming of radar, radio communication, infrared guidance and control methods.

0220. PROPAGANDA PROJECTILES

1. **Characteristics.** The purpose of propaganda projectiles is to deliver propaganda material (leaflets, flyers and other propaganda material) to the enemy area. In comparison to the air transport mode, it has less effect; only 70% of the content is usable.

a. **Construction.**

(1) **Body.** Propaganda projectile construction is similar to the illuminating projectile. It consists of a fuze, case with expelling charge, expelling charge (propellant), partition wall, housings with leaflets and removable bottom.

(2) **Expelling charge** is made from black powder or other low explosive.

(3) **Fuze**. Fuze is time delay.

0221. CONTAINER PROJECTILES

1. **Characteristics.** The transport of a large quantity of small bomblets (sub-munitions) on the target by the artillery means is modern concept that increases the destructive effect on the target. Sub-munitions carrier projectile also termed Improved Conventional Munitions (ICM).

The sub-munitions are normally dispensed in one of three ways: base ejection, nose ejection or case rupture. Base ejection is most common (Figure 2.19).

a**. Construction.**

(1) **Body.** The body of projectile is made of steel and if it is base ejection, it contains fuze, expelling case with expelling charge (propellant), and housing with sub-munitions and removable base.
When dealing with a projectile that ejects by rupturing the case, the projectile contains a fuze, bursting charge (most often small line cutting charge) and case with sub-munitions.

(2) **Sub-munitions filler**. Sub-munitions can have passive or active effect. Passive sub-munitions can be anti-personnel mines, anti-tank mines with conventional or shaped charges /area denial/.
Active sub-munitions includes small direct killing elements with fragmentation or shaped charge, fuel air explosive elements, unmanned sensors, and elements for jamming of radar, radio communication, infra-red guiding, etc. /impact/.
Sub-munitions incorporate stab-sensitive or all way acting fuzes which are extremely dangerous.

(3) **Fuze.** Projectile fuze is mostly point detonating, time delay or proximity fuze.

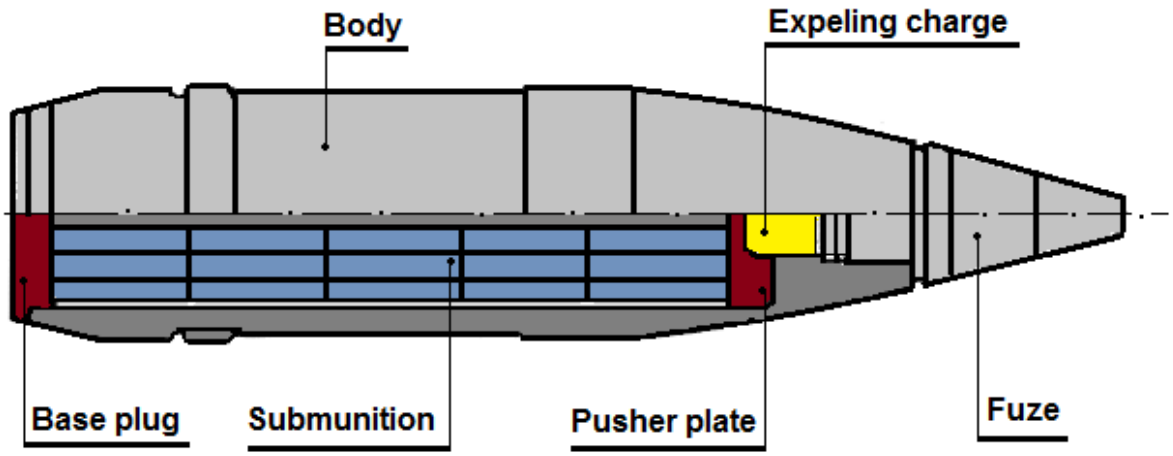


Figure 2.19

SPECIAL PROJECTILES

0222. PRACTICE PROJECTILES

1. **Characteristics.** Practice projectiles are designed for training purposes and to carry out tactical exercises, it means they are not for combat use. They can be fired but they do not produce explosion on the target, or only small flash. Practice projectiles are marked with a **red triangle**.

a. **Construction.**

(1) **Body.** The shape of body is the same as a live projectile.

(2) **Filler.** Some of them have completely inert filler. Some practice projectiles have a tracer to allow trajectory tracking to the target.
Some other projectiles incorporate a small low explosive or small high explosive charge to produce a visible flash at the target to confirm the accuracy of fire. Weight of the inert charge is the same as that in a live charge.

(3) **Fuze.** If there is a flash charge there will be a live, impact, instantaneously point detonating fuze.

0223. AMMUNITION TESTING PROJECTILES

1**.** **Characteristics**. Ammunition testing projectiles are designed for acceptance of the acquisition of ammunition production. Ammunition testing projectiles are marked with a **red rectangle**.

a. **Construction**

(1) **Body.** The shape of body is the same as a live projectile.

(2) **Filler.** Projectile is filed by live explosive charge or inert from asphalt with live primer. Weight of the inert charge is the same as in live charge.

(3) **Fuze.** There is a substitute dummy fuze.

0224. WEAPON TESTING PROJECTILES

1**.** **Characteristics.** Weapon testing projectiles are designed for acceptance tests weapons at the purchasing. Weapon testing projectiles are marked with a **red cross**.

a. **Construction.**

(1) **Body.** The shape of body is the same as a live projectile.

(2) **Filler.** Projectile is filled with inert material such as asphalt. Weight of the inert charge is the same as in life charge.

(3) **Fuze.** There is a dummy fuze.

0225. **DRILL, INERT PROJECTILES**

1. **Characteristics.** Drill or dummy projectiles are used purely to practice loading and handling weapon drills in training. Drill and dummy projectiles are marked with a **red circle.**

a. **Construction**

(1) **Body**. The shape of body is the same as a live projectile.

(2) **Filler**. They are no charge or tracer elements.

(3) **Fuze**. There is no fuze.

0226. **HIGH EXPLOSIVE ROCKET ASSISTED (HERA) PROJECTILES**

1. **Characteristics.** HERA is a design of HE projectile incorporating a rocket motor to increase the range of the projectile. The rocket motor igniter has a delay which enables the projectile to travel to the maximum azimuth (high point) of its normal trajectory before the rocket motor ignites and propels the projectile to the longer range; this increases the range of 30-50% (Figure 2. 20).

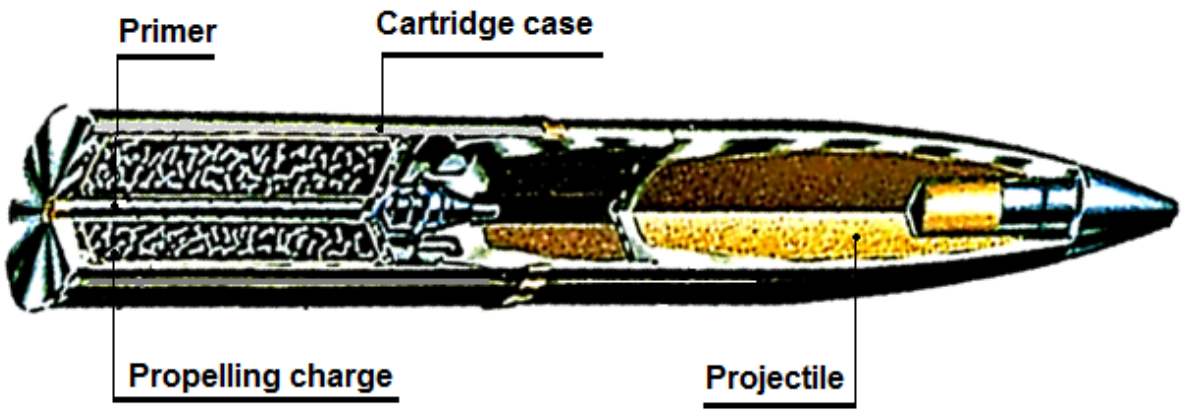


Figure 2.20

CARTRIDGE SYSTEM

0227. CONSTRUCTION OF CARTRIDGE SYSTEM

1. **Characteristics.** A cartridge system (Figure 2.21) is the part of a complete round that provides the means of propelling the projectile to the target. The projectile is fired at an initial velocity specified in the construction. The maximum gas pressure must not exceed a specified value (usually determined by the weapon model).

a. **Construction.** Cartridge system consists of:

– Cartridge case (fixed) or ignition pad (separated loading)
– Propellant,
– Propellant accessories,
– Primer screw.

Cartridge system is classified for two categories of ammunition:

– **Fixed**. The fixed cartridge is characterized by a constant muzzle velocity of projectile. The propellant charge is contained in a cartridge case.

– **Separated loading**. The muzzle velocity of the separated loading projectile is variable. The propellant charge is contained in fabric bags that have an ignition pad sewn to the bottom of the basic increment. As the entire charge and bags are burnt on firing, obturation becomes a function of the breech mechanism.

2. **Cartridge case.** Cartridge case is a protective cover for propellant and their accessories and primer. It prevents the rearward escape of propellant gas from the chamber. This is known as obturation and is achieved by the action of the cartridge case mouth expanding against the chamber walls under the pressure of the propellant gases. Cartridge cases are manufactured from many different materials, for example brass, steel, rayon, nylon, plastic, etc.

3. **Propellant.** A propellant is an explosive used to propel the projectile out of, or from a delivery system at a controlled velocity. It burns at a predicted rate even though some or all of its ingredients are capable of being detonated. It is essential that the rate of burning of a propellant should be controlled to achieve the desired velocity, ballistic regularity, and a safe maximum chamber pressure. Propellant is described more detailed in Chapter 1.

4. **Primer screw.** The primer screw (Figure 2.22) is either screwed or press fitted into the base of the cartridge case and has its own means of providing obturation. The primer can be activated by percussion and in some cases by electricity or both. Primers are generally made of the same metal as the cartridge case to avoid problems that could arise with differential expansion or corrosion if dissimilar metals were used. The primer must seal the escape of gases through the joint it makes with the case. It must possess sufficient strength to prevent the detachment of metal pieces on firing. Primers for separate loading ammunition are a separate unit.

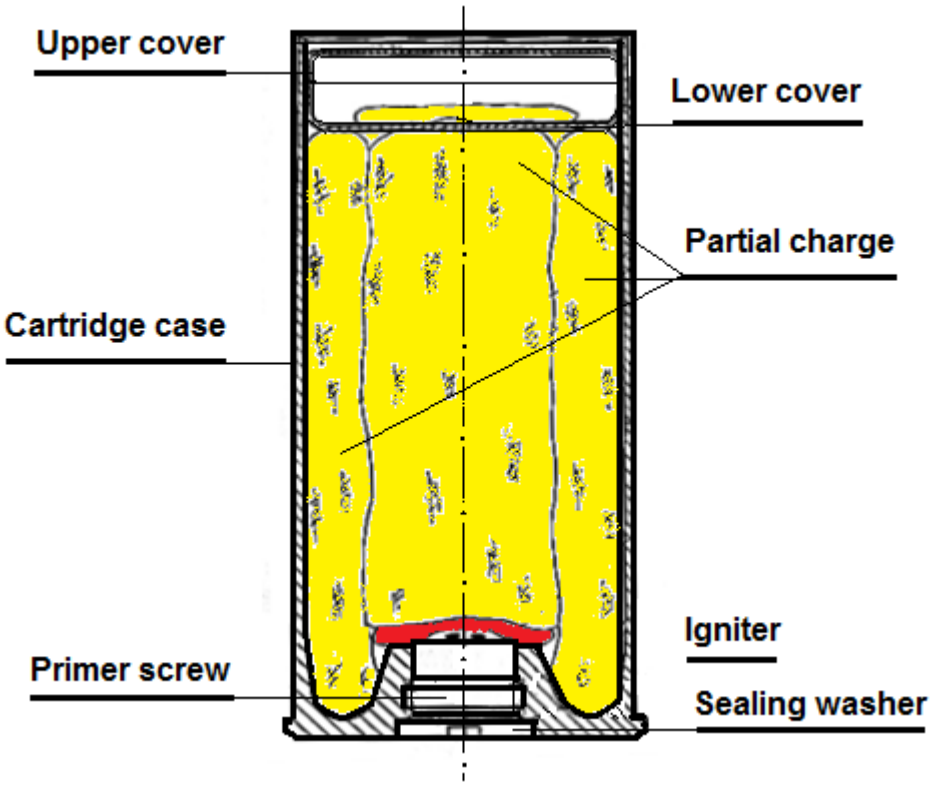


Figure 2.21

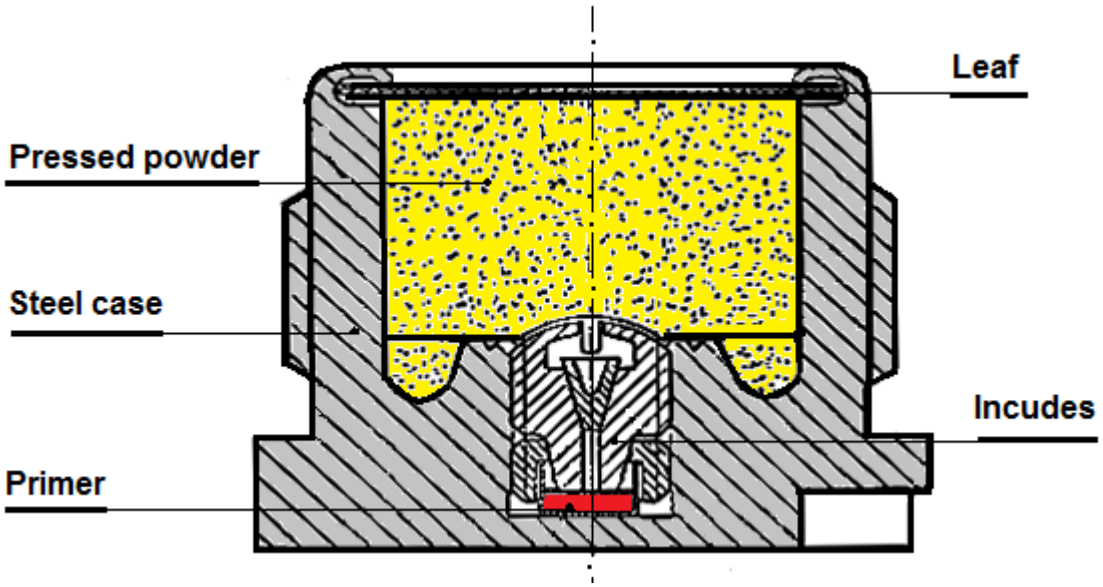


Figure 2.22

ARTILLERY MINE

0228. GENERAL CONSIDERATION

1. **Characteristics.** Artillery mines are fired from mortars. The purposes of mortar mines are to destroy personnel and material. Mortars are usually small, light and easily handled equipment that propels projectiles at high angles of elevation (over 45º). They are usually loaded through the muzzle whereas guns and howitzers are loaded through the breech. Mortars usually have smooth bores but can have rifled bores and can be stabilized by stabilizing fins or spin. Artillery mines can be classified as artillery projectiles. Mortars are of different calibres from 40 mm to 400 mm. Mortar mines consists of a body, explosive charge, stabilizer fin, fuze, propellant charge and primer (Figure 2.23).

a. **Construction**

(1) **Body**. The body of the mine is made of one piece or with screwed adapter from steel or cast iron. Body is teardrop-shaped, (Figure 2.23) sometimes with elongated central part (Figure 2.24) and consists of a head part, central part and rear part.
The head part is a circular arc with a small radius of curvature. The length of the head is often in the range of 0.7 - 2diameters. Cylindrical part serves as a guide, and length is from 0.4 to 0.5 diameters. Also performs task as bourellet or a labyrinth gas seal.
Rear part is elongated and forms a circular arc of a large radius of curvature. It reaches the length of 1.2 to 2.5 diameters. It is provided with a threaded connection to the stabilizer fin.

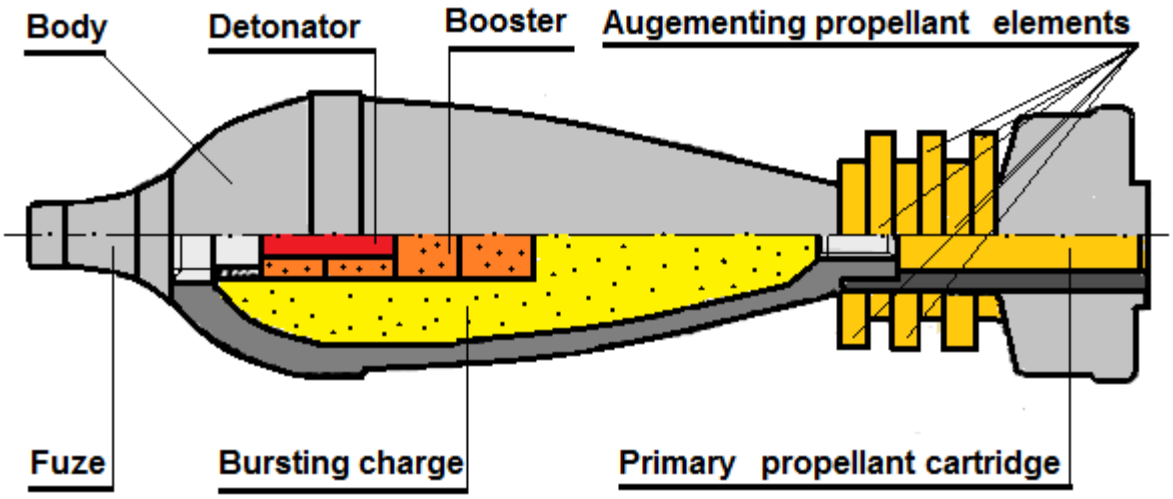


Figure 2.23

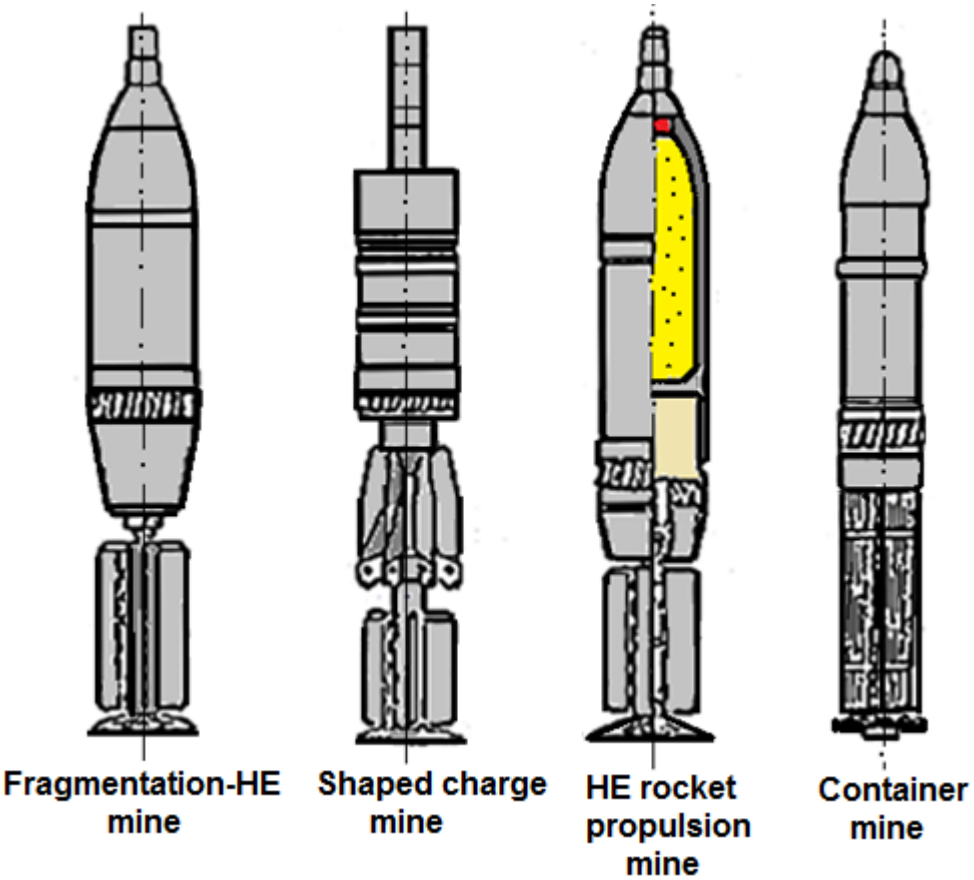


Figure 2.24

(2) **Blasting charge**. The mine's explosive charge varies according to their purpose. It can be high explosive, fragmentation, smoke or other, like gun and howitzer projectiles.

(3) **Propellant charge.** Propellant charges consists of two types of charges:

– **Primary cartridge** is the basic charge and is inserted into the stabilizing tube. Primary cartridge is made from cardboard tube with metal (brass) bottom. It consists a primer, tube with the ignite train from black powder and propellant charge.

– **The augmenting charge** is an auxiliary charge contained in textile fabric or celluloid bag of various shapes (Figure 2.25) Mortar mines are separate loading ammunition, since the amount of augmenting charges on the stabilizer tube can be changed.

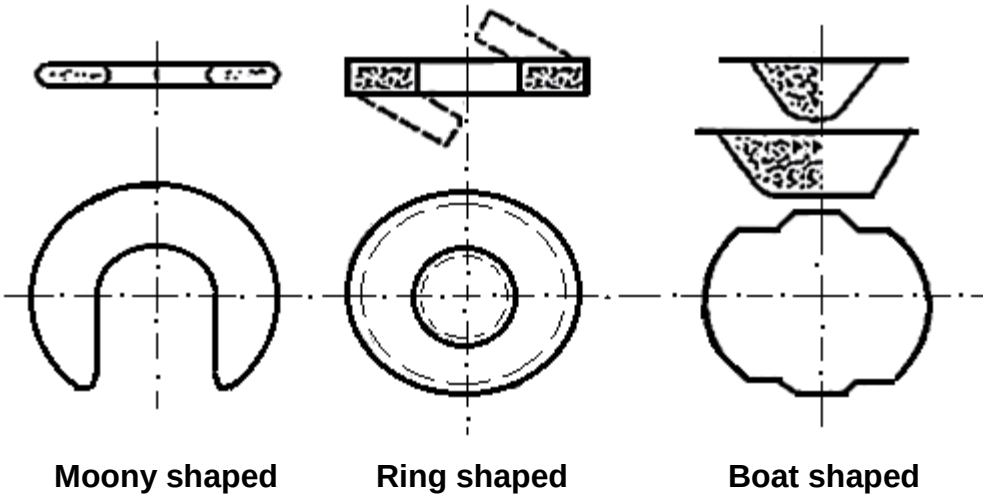


Figure 2.25

(4) **Stabilizer fin.** It provides stable flight artillery mines on the flight path. A stabilizater tube is made of a steel tube with a threaded end for connection to the body mine. The tube has usually six rows of holes to transfer the flame from the primary cartridge to the augmenting charge (Figure 2.26).

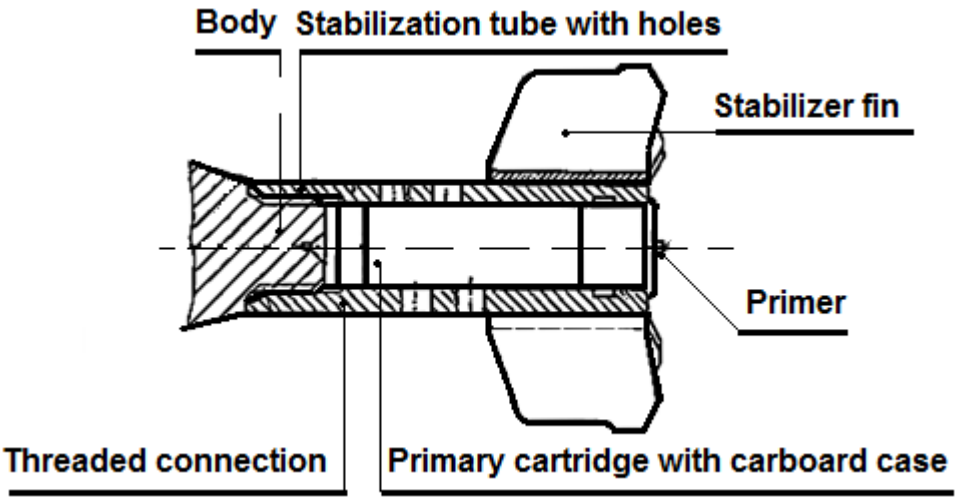


Figure 2.26

(5) **Fuze**. Mortar mines use instantaneously, impact, nose fuzes.

2. **Classification.** Classification of artillery mines by purpose:

a. **Basic**

– High explosive (HE);

– Fragmentation**;**

– HE/Fragmentation;

– High explosive antitank (HEAT).

b. **Special**

– Illumination;

– Smoke.

c. **Support**

– Practice;

– Drill.

0229. **BASIC MORTAR MINE**

1. **High explosive mortars mine.** It is designed to destroy buildings and trenches by the pressure of gas created in the explosion. The body of mine is steel, teardrop-shaped and cylindrical. It is used in larger calibres (120, 160mm). Bursting charge is trinitrotoluene. Coefficient alpha is 25 to 35%. Fuze used is nose, impact with time delay.

2. **Fragmentation mortars mine.** Fragmentation mines are characterised by large angles of impact which allows the application of the maximum number of fragments that are created in an explosion of the mine. Mine body is made of steel or cast steel teardrop shape. Frag mines are made usually of smaller calibre (82 mm). Bursting charge is trinitrotoluene and a coefficient of performance is from 10 to 15%. For initiation frag mines use nose, impact, instantaneous fuzes.

3. **HE/Fragmentation mortars mine.** Fuzes of this mine can be adjusted to fragmentation effect or high explosive effect. They are used by larger calibres (120, 160mm). The body is steel, teardrop shape filled with trinitrotoluene, with a coefficient alpha is 10 - 18%. Fuze is nose, impact with time delay.

4. **High explosive antitank mortar mine**. HEAT mines was developed by French company THOPSON-Brand for 120 mm mortars with rifled barrels. Mine is spin stabilized and allows the destruction of light armoured vehicles at a large range. The body is made of steel, which is preformed for the formation of fragments of optimal size and weight. The main bunch of fragments is concentrated of 150 cm above the ground. Fragments penetrate armour from 12 to 15 mm of thickness at a distance up to 15 m from the point of impact. Fragments density reaches 1.5 to 3 fragments for 1 m^2. High explosive antitank mine weighs 18.7 kilograms and allows shooting at ranges from 1,000 to 8,135 m.

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CHAPTER 3
HAND GRENADES

0301. CHARACTERISTICS

1. **Definition.** A hand grenade is small item of ammunition filled with explosives or other special filler. It can be thrown by hand. A characteristic feature of the hand grenade is quite significant disruptive effect. Hand grenades are designed for close combat in the trenches and shelters. They are very powerful in attack and defence combat.

2. **Construction.** A hand grenade has a hollow body made of metal or hard plastic, filled with an explosive charge and is initiated by a fuze. The bursting charge ruptures the grenade body and spreads many fragments into the surrounding area. The surrounding area is also affected by the blast wave. The main structural parts of a hand grenade are:

a. **Body** it is made of metal, usually steel or cast iron, or other metallic or plastic material. The shape of the grenade shape is adapted to provide the form for throwing

b. **Effective filling** is filled into the cavity of the body grenade. Usually it is explosive, or other special filler (smoke, incendiary, chemical, etc.), which is initiated by the fuze at the target.

c. **Fuze** is a device intended to cause the initiation of the grenade. Construction of the fuze varies on the desired time of initiation of grenade at the target. Fuze function is carried out by the individual initiators and other elements filled with explosive (primer, detonator, cap, time setter, etc.). In addition to the initiating the grenade, the fuze must provide safety in storage, handling, and functioning.

0302. HAND GRENADE CLASSIFICTION

1. **Tactical classification:**

- Offensive grenades;
- Defensive grenades;
- Universal/ Combined grenades.

a. **Offensive grenades are** used in the attack. They have a thin wall and their functioning creates a large number of small fragments. The lethal radius is limited to approximately 15 m in order to avoid injury to the attacking troops. Offensive grenades detonate generally immediately after the impact (Figure 3.1). Main features:

– Lower weight;

– Greater weight of explosive;
– Short lethal range.

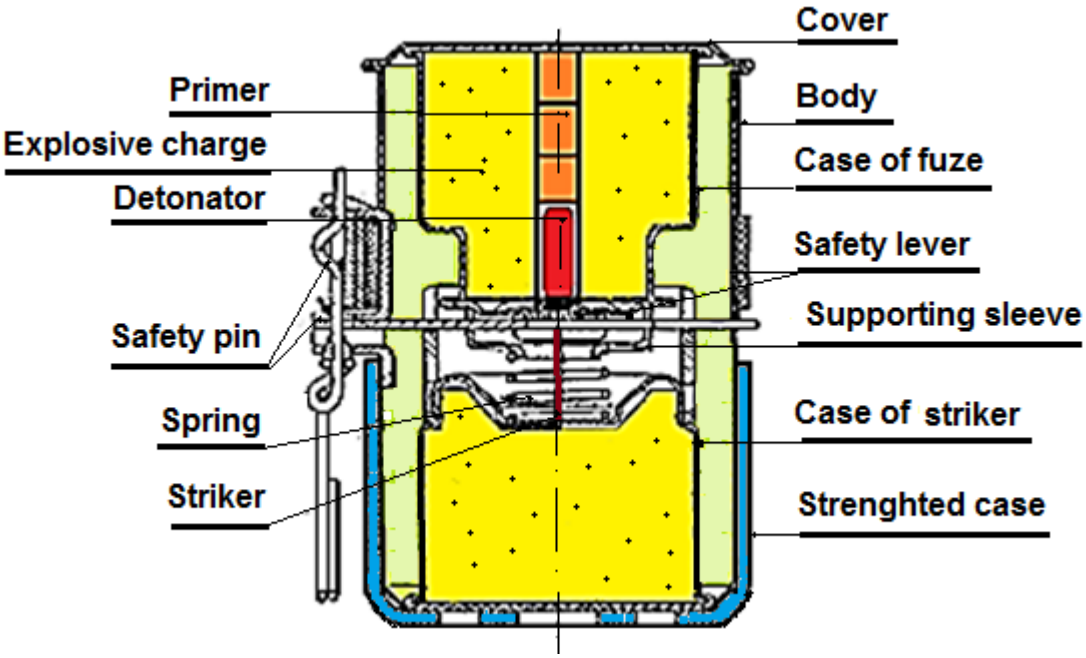


Figure 3.1

b. **Defensive grenades** are used in the defence, thrown mainly from shelters or trenches. Their main feature is a thick body, usually longwise and laterally grooved to create big fragments which can have a lethal radius between 100 and 200 metres. Defensive grenades detonate generally with time delay (Figure 3.2). Main features:

– Greater weight;
– Lower weight of explosive;
– Longer lethal range

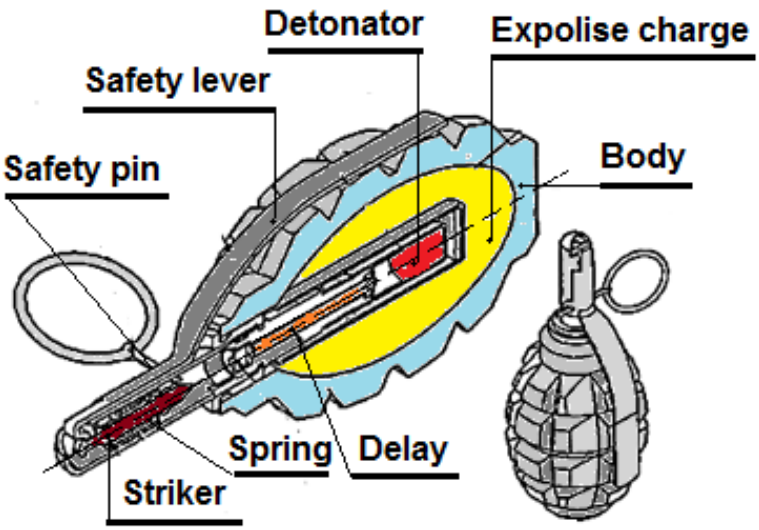


Figure 3.

c. **Universal/Combined grenades.** The advantages of both groups grenades can be found in combined grenades. Combined grenades in the basic version can be used as offensive grenades, after simple preparation (mounting strengthened casing on the battlefield) is achieved the effect of a defensive grenade (Figure 3.3).

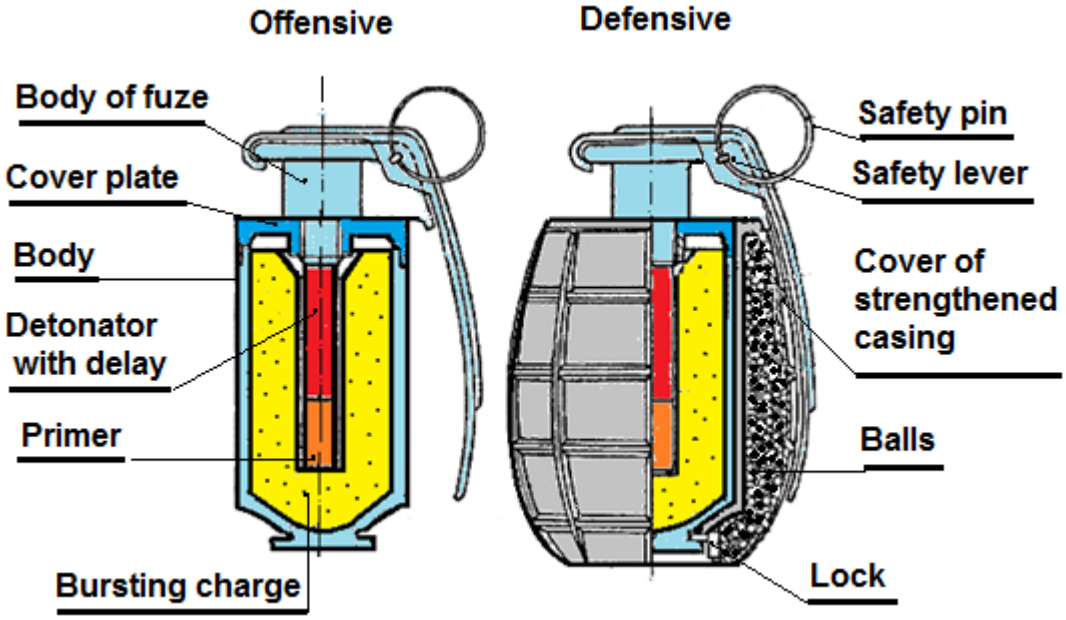


Figure 3.3

d. **Special hand grenades.** They are used to meet specific tasks:

– **Anti-tank** grenade;

– **Chemical** grenade. Unlike explosive grenades, chemical and gas grenades are designed to burn or to release a gas, not to explode;

– **Smoke** grenade. Smoke grenades are used as ground-to-ground or ground-to-air signalling devices, target or landing zone marking devices, and screening devices for unit movement;

– **Riot control** grenade. Tear gas grenades are similar to smoke grenades in terms of shape and operation;

– **Incendiary** grenade or thermite grenades produce intense heat by means of a chemical reaction;

– **Stun** grenade, also known as a flash grenade or a flash bang, is a nonlethal weapon;

– **Sound** grenades. The sound save grenade releases an extremely loud acoustic report. Its sound waves are so strong they are capable of cracking walls, similar to an earthquake.

2. **Methods of activation.** According to the method of activation, hand grenades are divided into:

- Impact;
- Time delay;
- Double.

a. **Impact hand grenades**. Detonated after impact by the action of inertial forces (Figure 3.1).

b. **Time delay hand grenades.** They have a time fuze which contains a graduated time element to regulate the time interval after which the fuze will function. Time fuze starts acting after throwing hand grenade, during flight phase (Figure 3.2).

c. **Double hand grenades.** Their universality lies in the option choice needed functions, it means the impact function or time delay function. This option is allowed by time fuze.

3. **Construction classification:**

- Action,
- Reaction.

a. **Action**. Firing striker is under tension from the firing spring but is locked. During the flight, the striker is unlocked by the centrifugal forces. After the impact the centrifugal forces stops and the striker is thrown by the firing spring towards to cap.
This grenade requires special training in proper throwing. If it is thrown incorrectly, without sufficient rotation, the grenade does not explode.
When the grenade does not explode after impact, it is extremely dangerous to move it.

b. **Reaction.** The firing striker is held off the cap by the firing spring. After impact inertial forces overpower the firing spring force and the firing striker activates the grenade.

4. **Methods of delay activation:**

a. **Activated before thrown** by the friction firing fuze. It form has a longer delay.

b. **Activated after thrown.** Time delay element is activated only after the throwing, until then it is safe.
Example: RGD-5 – *Ruchnaya Granata Distantsionnaja* (Figure 3.4);

0303. **EXAMPLES OF HAND GRENADES**

1. **USSR HAND GRENADES** (Figure 3.4)

RDG-5

RG F-1

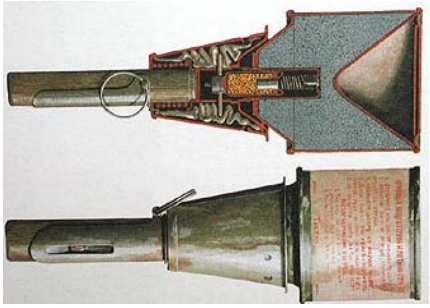
RG-42

ROG-43

RGO

RGN

RGD-33



RPG-43

RPG-6

RKG-3

Figure 3.4

2. **CZECHOSLOVAK HAND GRENADES** (Figure 3.5)

RG-34

RG-4

URG-86

Figure 3.5

3. **BULGARIAN HAND GRENADES** (Figure 3.6)

RGO-78

RGN-75

Figure 3.6

4. **YUGOSLAVIAN HAND GRENADES** (Figure 3.7)

M-75

M-50

M-52

M-69

Figure 3.7

5. **POLISH HAND GRENADES** (Figure 3.8)

RGZ-89

Figure 3.8

6. **ROMANIAN HAND GRENADES** (Figure 3.9)

F-1 with FGM fuze

Figure 3.9

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CHAPTER 4
MINES AND CHARGES

0401. GENERAL DESCRIPTION

1. **Mines and charges** are part of Military Engineer Ammunition. They are designed to prevent or make enemy movement difficult and provide a measure of force protection. Military Engineer Ammunition includes:

- Mines;
- Fuzes;
- Engineer charges;
- Mine clearing equipment.

0402. MINES

1. **Characteristics.** A land mine is an explosive device, concealed under or on the ground and designed to destroy or disable enemy targets as they pass over or near the device. Such devices are typically detonated automatically by way of pressure from the target stepping or driving on it, though other detonation mechanisms may be possible. The device may cause damage either by a direct blast or by fragments that are thrown by the blast. Mine contains explosives or other effective explosive substance placed in a suitable container and a firing device for activate it. They are designed to be placed under, on or near the ground or other surface area and to be actuated by presence, proximity or contact of person, land vehicle, aircraft or boat. Mines are classified by their designation to:

- Antipersonnel;
- Antitank;
- Special.

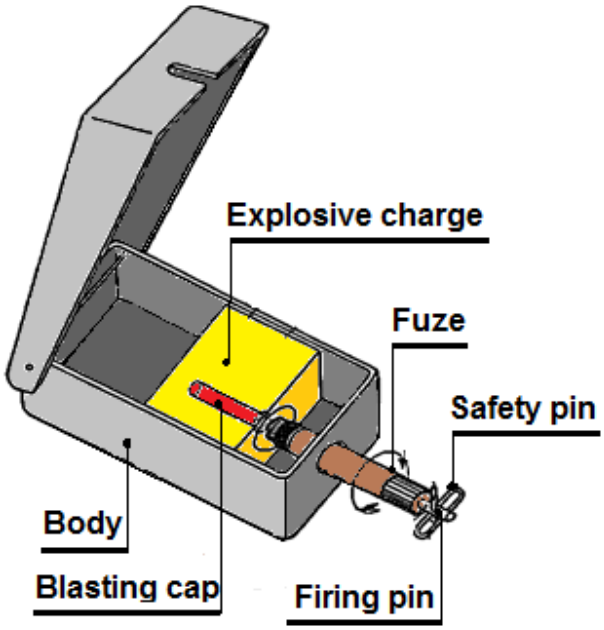
0403. ANTIPERSONNEL MINES

1. **General description.** Mines that detonate by the presence, proximity or contact of a person and that will incapacitate, wound or kill one or more persons. Antipersonnel mines are classified by their construction features as:

- Blast mines;
- Fragmentations mines.

a. **Construction of blast mines** (Figure 4.1). Blast mine destroy personnel by a shock wave which arises due to the mine’s explosion. The body of the mine is made of wood, metal or plastic material. Typically, anti-personnel blast mines are triggered when the victim steps on it. Their primary purpose is to blow the victim's foot or leg off, disabling

them. Injuring, rather than killing, the victim is viewed as preferable in order to increase the logistical (evacuation, medical) burden on the opposing force. The mine is activated by the pressure on the pressure plate; breaking the safety pin and releasing the firing pin initiates the detonator and main charge. The International Campaign to Ban Landmines has sought to ban land mines culminating in the 1997 Ottawa Treaty, although this treaty has not yet been accepted by a number of countries, including the USA, Russia, and People's Republic of China, Pakistan and India. May be of different design and made from different materials (Figure 4.2).



PMD-6

Coutry of origin: Former USSR
Explosive weight: 200 g
Wooden body

PMN

Coutry of origin: Former USSR
Explosive weight: 250 g
Bakelite body

PFM-1;1S

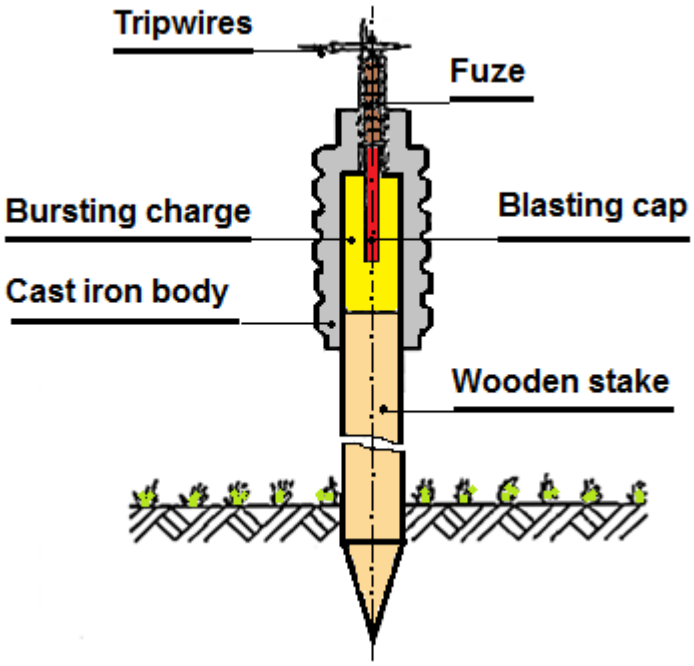
Coutry of origin: Former USSR
Explosive weight: 35 g
Bakelite body

PMA-2 Coutry of origin: Former Yugoslavia
Explosive weight: 100 g
Plastic body

Figure 4.1

b. **Construction of fragmentations mine**. While blast mines are designed to cause severe injury to one person, fragmentation mines are designed to project fragments across a wide area, causing shrapnel wounds to nearby personnel. Fragmentation mines are generally much larger and heavier than blast mines, and contain a large amount (often several kilograms) of ferrous metal. As such, they are easy to detect if the environment is not too heavily contaminated with iron. Fragmentations mines are classified by their construction features to:
   – Stake;
   – Bounding;
   – Directional.

(1) **Stake mine** (Figure 4.2). These mines (such as the Russian POMZ) are entirely above ground, having a fragmenting warhead mounted on a stake at a suitable height, concealed by vegetation or rubbish and triggered by one or more tripwires.



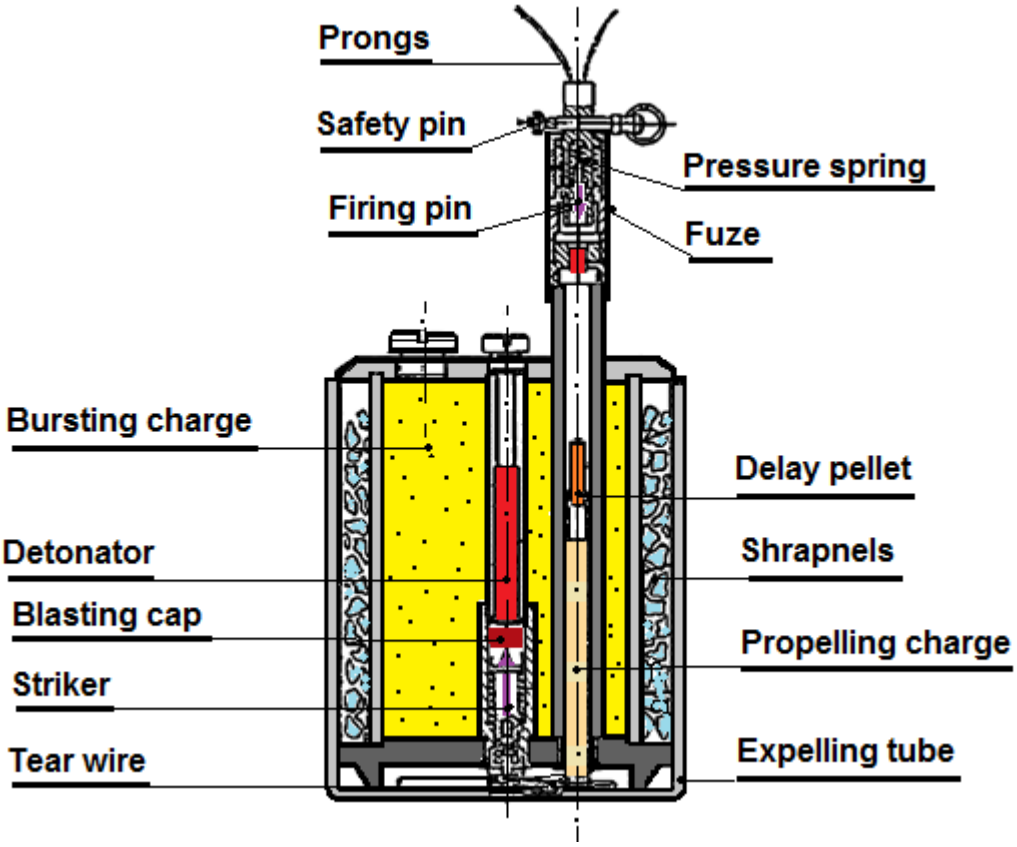
POMZ-2 Coutry of origin: Former USSR
Explosive weight: 75 g

PMR-2A Coutry of origin: Former Yugoslavia
Explosive weight: 100 g

PMR-3 Coutry of origin: Former Yugoslavia
Explosive weight: 410 g

Figure 4.2

(2) **Bounding mine** (Figure 4.3). A bounding mine is an anti-personnel mine designed to be used in open areas. When tripped, a small propelling charge launches the body of the mine 1m into the air, where the main charge detonates and sprays fragmentation at roughly waist height. Bounding mines are more expensive than typical AP blast mines, and they do not lend themselves to scatterable designs. Because they are designed to be buried, they are appropriate for command-detonated ambushes, but tripwire operation is common as well. By design, bounding mines contain a large amount of steel, which makes them comparatively easy to detect with metal detectors. However, it is often the case that minimum metal mines have also been planted in the same minefield, which complicates the demining process.

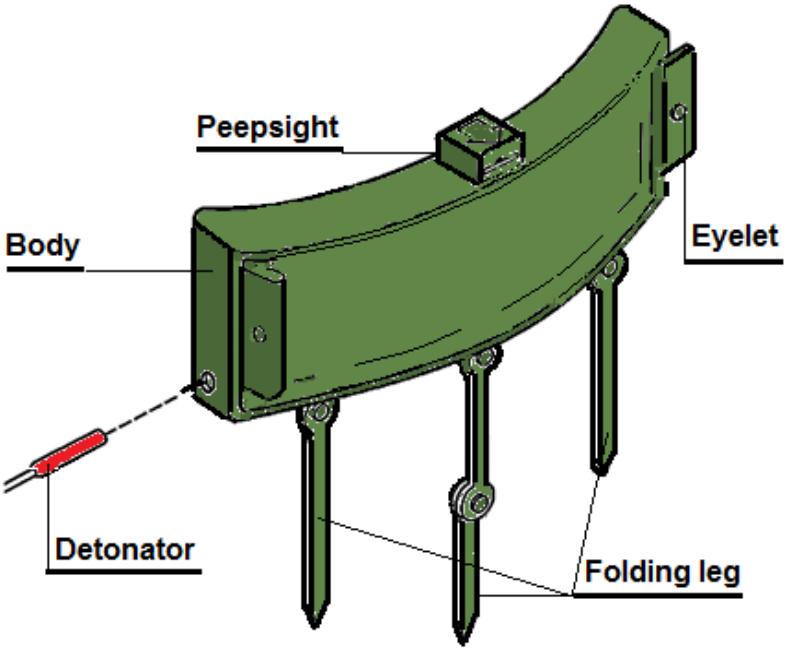


PP-Mi-Šr-II Coutry of origin: Former Czechoslovakia
Explosive weight: 325 g

OZM-72 Coutry of origin: Former USSR
Explosive weight: 660 g

Figure 4.3

(3) **Directional mine** (Figure 4.4). Directional fragmentation weapons (such as the MON 50 Russian mine or M -18 US mine) differ from other types in that they are designed to direct their fragments only in limited arc. They are placed so that the blast will be directed at the target area and away from friendly forces. This design also allows forces to protect themselves by placing these types of mines near their own positions, but facing the enemy. They are triggered in a conventional manner with either tripwire or command detonation. They are generally referred to as claymore mines from the US mine of this type.



MRUD Coutry of origin: Former Yugoslavia
Explosive weight: 900 g gelatine explosive

MON-50 Coutry of origin: Former USSR
Explosive weight: 700 g RDX

Figure 4.4

0404. **ANTITANK MINES**

1. General description. An anti-tank mine is a type of land mine designed to damage or destroy vehicles including tanks and armour personnel carriers. Compared to anti-personnel mines, anti-tank mines typically have a much larger explosive charge, and contain a fuze designed only to be triggered by vehicles or, in some cases, tampering with the mine. These mines are pressure activated, but are typically designed so that the footstep of a person will not detonate them. Most anti-tank mines require an applied pressure of 158 kg to 338 kg in order to detonate. Anti-tank mines are classified as blast or shaped charge. There are no bounding or fragmentation anti-tank mines.

Modern anti-tank mines use more effective explosive payloads (different explosive compounds and shaped charge effects),use of non-ferrous materials making them harder to detect, new methods of deployment (from aircraft or with artillery), more sophisticated fuzes (triggered by seismic effects or combinations of effects) and sophisticated "anti-handling" devices to prevent or discourage tampering or removal. Antitank mines are classified by their construction features to:

– Blast mine (anti - track);

– Shaped charge mine

a. **Construction of blast antitank mine**.(Figure 4.5) A typical land mine includes the casing, firing mechanism or other device (including anti-handling devices), detonator or ignite, booster charge, main charge usually forms the body of the mine. All blast mines, destroy the tank's tracks and as much of its body as possible. Blast anti-tank mine contains a main charge of TNT or RDX. It weighs from 8 to 12 kg. In Figure 4.6 shows some types of mines used in the FWP.

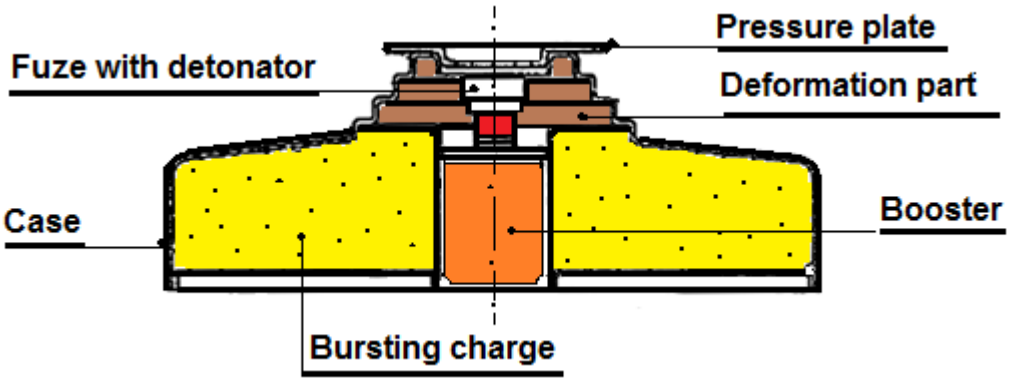


Figure 4.5

PT-mi-K

Coutry of origin: Former Czechoslovakia
Weight: 7,200 g
Explosive weight: 5,000 g
Metal body

MPP-B

Coutry of origin: Former Poland
Weight: 9,700 g
Explosive weight: 8,100 g
Fiberglass body

TMP-46

Coutry of origin: Former USSR
Weight: 8,600 g
Explosive weight: 5,700 g
Metal body

TM-57

Coutry of origin: Former USSR
Weight: 8,470 g
Explosive weight: 6,340 g
Metal body

TM-62M

Coutry of origin: Former USSR
Weight: 9,500 g
Explosive weight: 7,500 g
Metal body
TM-62P Plastic body
TM-62B Cardboard cased
TM-62D Wooden cased

PT-mi-Ba III

Coutry of origin: Former Czechoslovakia
Weight: 10,800 g
Explosive weight: 8,000 g
Plastic body

Figure 4.6

b. **Construction of shaped charge antitank mine.** (Figure 4.7; 4.8) For attacking heavily armoured battle tank shaped-charge mines are used. These are designed to affect the whole vehicle width and therefore fewer mines are needed to build minefields. The shaped charge effect (Munroe effect) is used to penetrate the bottom of hull. The belly armour is pierced and secondary explosions in the interior of the tank destroy it. This type of shaped charge mine is usually activated by tilt rod fuze; however it can use magnetic, seismic or acoustic sensors.

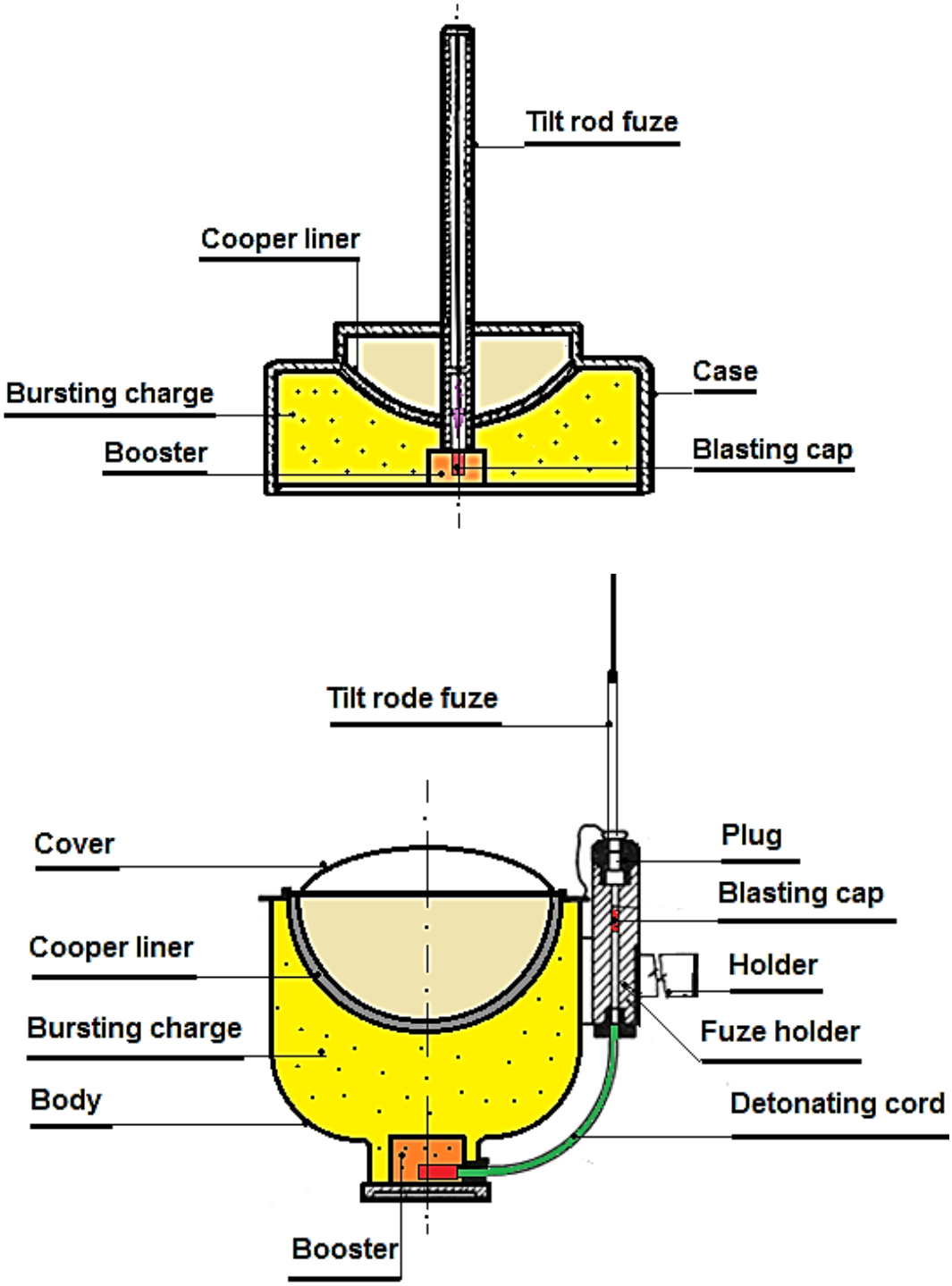


Figure 4.7

TMK-2

Coutry of origin: Former USSR
Weight: 12,000 g
Explosive weight: 6,500g TG-50
Metal body

TM-89

Coutry of origin: Former USSR
Weight: 11,500 g
Explosive weight: 6,700g TG-40/60
Metal body

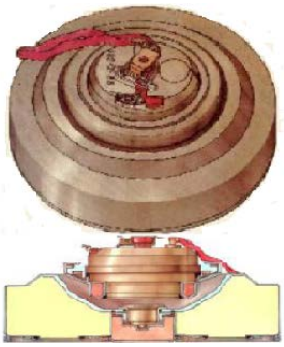


Figure 4.8

c. **Construction of "Off road anti-tank mines".** Construction of "Off road anti-tank mines" (also known as **"Horizontal effect mines"**) is based on shaped charge effect (Munroe effect) or the Misznay–Schardin effect (platter effect or the Explosively Formed Projectile (EFP)).

Horizontal effect mines which uses Munroe effect are designed to be autonomous off-route anti-tank mine based on the shoulder-launched anti-tank rocket (LAW). It consists of a tripod, firing unit, cable, initiator, launcher tube and rocket with shaped warhead.

Horizontal effect mine which uses the Misznay–Schardin effect (Figure 4.9) is a characterised by the detonation of a broad sheet of explosive. The explosive's detonation wave (and to a lesser extent the propulsive effect of its detonation products) project and deform a plate or dish of ductile metal (such as copper, iron, or tantalum) into a compact high-velocity projectile, commonly called the slug. In Figure 4.10 shows some types of horizontal mines used in the FWP.

Horizontal effect mines are designed for eliminating armoured fighting vehicles and means of military transport from battlefield by striking the side of them. They are useful in cases where the ground or surface is not suitable to bury a mine. The mine is placed at the side of the road and a thin electric 'breakwire' is laid out across the vehicle's path. The mine is initiated when the vehicle breaks the wire. A further development attacks the rather weakly armoured top side (roof) of many tank types. Horizontal effect mines use in-

fluence fuze or contact fuze, infra-red and acoustic sensor. The mines are also effective in eliminating vehicles with reactive armour. They may be scattered in urban areas, mountain passes, forests and every time in conditions which make the use of other antitank mine impossible or useless.

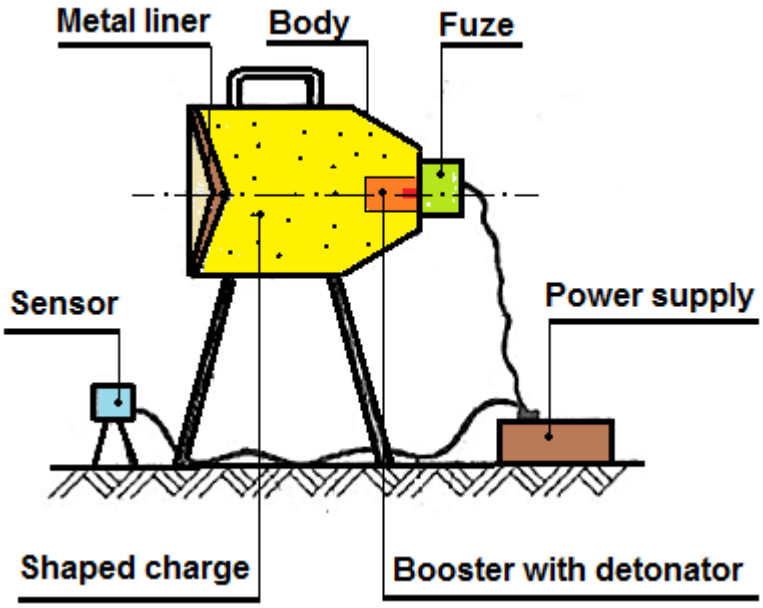


Figure 4.9

PD-Mi-PK

Coutry of origin:	Former Czechoslovakia
Weight:	10,100 g
Explosive weight:	8,500g
Efective range:	30 m
Penetration:	20 mm
Initiation:	Command wire;contact cable;trip wire.

TM-83

Coutry of origin:	Former USSR
Weight:	28,100 g
Explosive weight:	9,600g TG 40/60
Efective range:	50 m
Penetration:	100 mm
Initiation:	Electronic fuze with seizmic or acoustic sensor,anti-handling devices

PMB	Coutry of origin:	Poland
	Weight:	45,000 g
	Explosive weight:	9,600g TG 40/60
	Efective range:	50 m
	Penetration:	100 mm
	Initiation:	Contact fuze passive infra red and acoustic sensor,anti-handling devices

Figure 4.10

d. **Anti-helicopter mine**. In connection with the increase in the use of helicopters in modern armies and tactics of flight in zero height have been developed anti-helicopter mines. Most are equipped with infra-red sensor and acoustic sensor, with Doppler radar to locating the target and trigger the initiation. Initially, the mines were simply directional mines (claymores) in which a layer of steel fragments were propelled by the high explosive charge. Some used multiple charge, incorporating Misznay Scharding warhead in addition to a conventional fragmentation matrix (Figure 4.11) and some used only shaped charge with platter effect. The effect is achieved with a shaped charges with liner, the efficiency is up to 200 m. The use of multiple charges, Misznay-Scharding platter warhead toghether with conventional fragmentation warhead is unique to these weapons. They are usually large devices placed by hands. In the figure 4.12 is Bulgarian hanti-helicopter mine AHM-200-1.

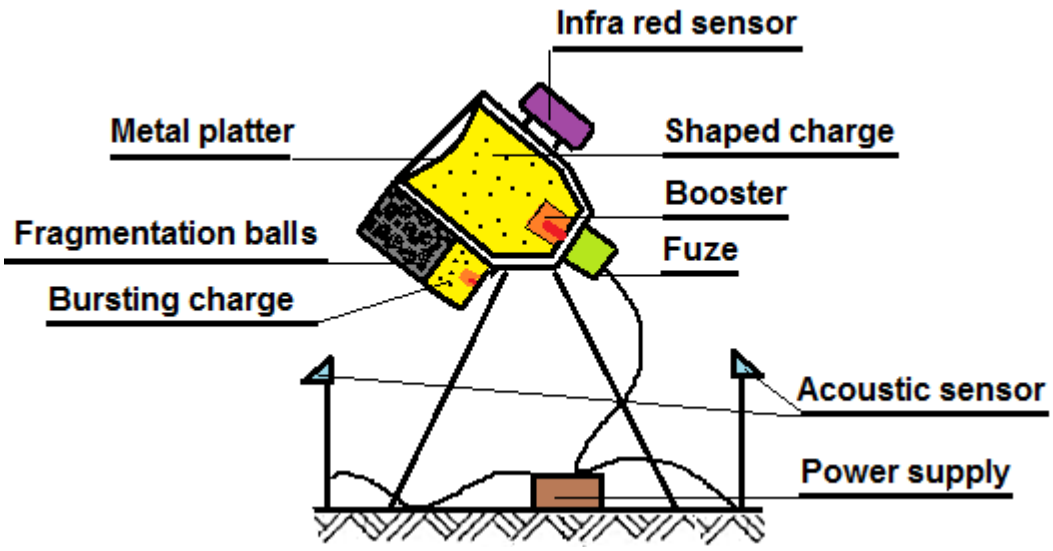


Figure 4.11

AHM-200-1	Coutry of origin:	Bulgaria
	Weight:	90,000 g
	Explosive:	TNT
	Efective range:	100 m
	Balls:	17,000 g
	Initiation:	Acoustic with Doppler radar

Figure 4.12

0405. FUZES

1. **Characteristics.** A fuze is a mechanical devices used to initiate a detonation. Fuzes are used for adjusting the engineer mines, engineer improvised obstacles and booby traps. Fuzes are provided in many forms and sizes. The fuze consists of components which are designed to initiate a train of fire or detonation by an action such as hydrostatic pressure, electric energy, chemical reaction, mechanical pressure and pull, and release of tension or pressure, timer or a combination of these. Typical engineer fuzes include casing, safety pin, shear pin, striker or firing pin, cap and spring.

a. According to the firing principle, fuze can be classified as following:

- **Mechanical fuze**. The mechanical fuze most often uses strikers to strike a percussion cap (or blasting cap).
- **Chemical fuze**. Chemical fuzes function to when it is subjected to a force, causing chemical reaction in the fuze and produce flame to detonate the blasting cap.
- **Electric fuze**. Electric fuzes fire in case that it is subjected to a force or influence of electromagnetic field, light or sound etc. making the electric circuit complete.

b. According to actuation manner, fuze can be classified:

- **Contact fuze.** Functions under direct, physical contact of the target, for instance, pressure actuated fuze, pull actuated fuze, release actuated fuze, cut-off actuated fuze, prong fuze and tilting actuated fuze etc.
- **Non-contact fuze** Refers to the fuze, which is not actuated by direct and physical contact from the target, but by effects and influence of the physical

fields between the target and the fuze, for instance, magnetic fuze, concussion fuze, acoustic fuze, microwave fuze and various non-contact composite fuze.

c. According to firing time, fuze can be classified :

– **Instantaneous fuze**. Refers to the fuze that will be immediately fired upon effect of the target.
– **Time delay fuze**. Refers to the fuze, which fires on the delay time set by the user; no effect of the target is needed.

d. At the engineer tasks, the most commonly used:

– Pull and pressure fuzes;
– Anti-handling fuzes;
– Time delay fuzes.

2. **Pull and pressure fuzes**. Pull (Figure 4.13) and pressure (Figure 4.14) fuzes are widespread among antipersonnel mines such as pressure mines, contact mines, trip mines and other mines for diversionary purpose. In these fuzes, a striker under spring pressue is held by a safety pin. The safety pin also can performed function of firing pin. At the bottom of fuzes is located screw fit primer with cap. When the safety pin is pulled out, the spring drive the striker into the cap and activates the fuze. The preloaded spring with striker principle is used in many types of fuzes in variously modifications, such as with using a shear pin.

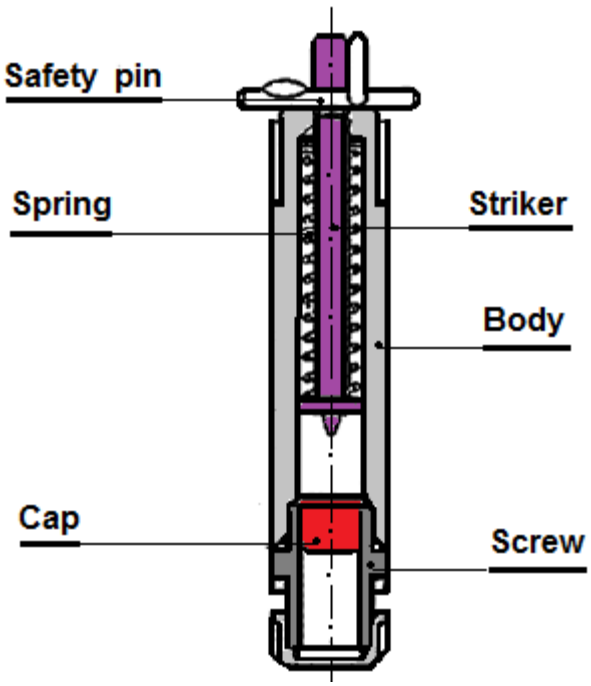


Figure 4.13

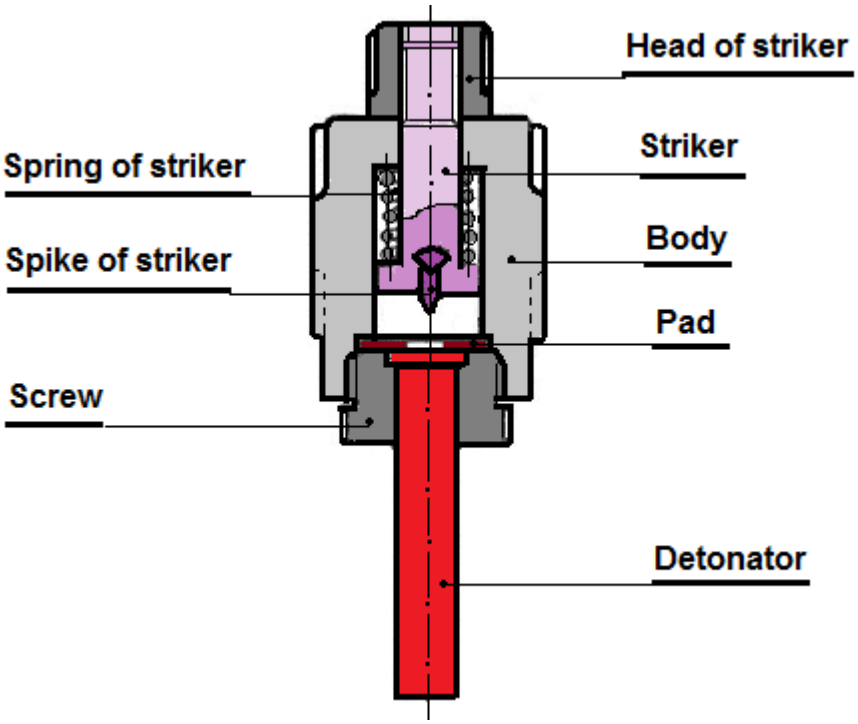


Figure 4.14

3. **Anti-handling fuzes**. They are used to prevent the removal of mines and charges. Typical anti-handling fuze from the World War II is at the figure 4.15. Striker is fixed by safety lever and spring of pressure plate. The pressure plate with a press button placed in the centre of fuzes and is held by a safety pin. Removal of the safety pin also starts a clockwork delay. After the loading the fuze in the mine or charge the safety pin is removed which starts the clockwork. In pre-set time clockwork releases its hold on the striker. When the mine or charge is lifted, press button releases the striker by lifting the safety lever and the striker hits the detonator.

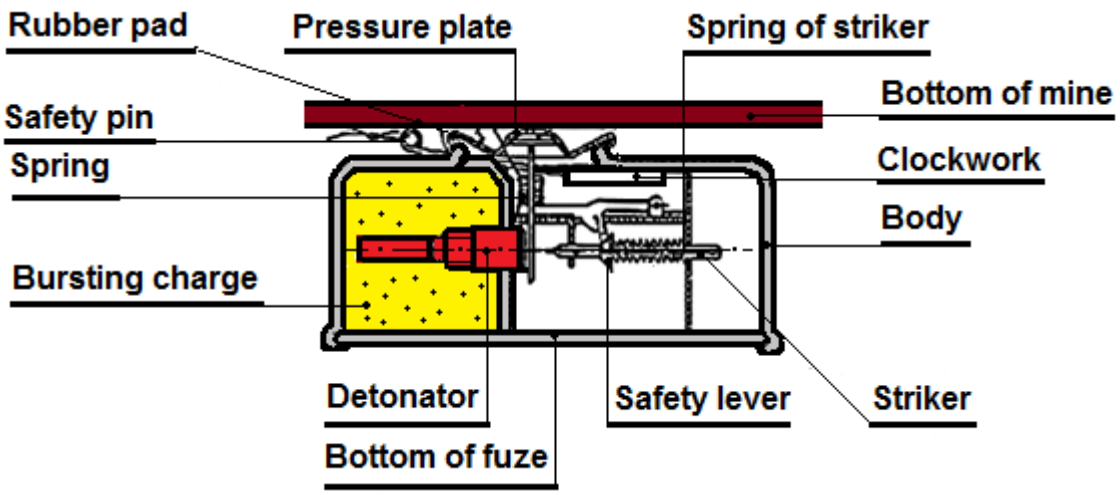


Figure 4.15

4. **Time delay fuzes.** Time delay fuzes are classified by length of delay time as short term and long term. Most use either mechanical (clockwork) and/or chemical. An acid ampoule is broken and corrodes a safety lever which holds a striker.

0406. ENGINEER CHARGES

1. **Characteristics.** Engineer charges are designed primarily for building explosive barriers, gun banks and various shelters as well as destroying obstacles, enemy barriers, bridges and other military construction. Engineer ammunition is also used to destroy unexploded ordnance, abandoned ordnance and stock pile of ammunition. It includes:

– Standardized demolition charges;

– Special charges.

2. **Standardized demolition charges** (Figure 4.16). Standardized demolition charges are usually hand placed, used to produce a blasting, shattering, or penetrating effect. Standardized demolition charges are classified according to their size to 50 g, 100 g, 200 g, 400 g and 1 kg, 2 kg, 3 kg, 5 kg.

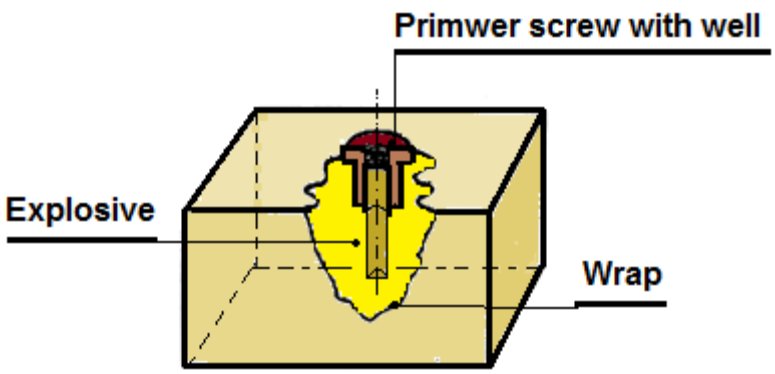


Figure 4.16

They are producing by pressing of TNT. Every charge is equipped by screw with primer well and wrapped by wax paper.

3. **Special charges** are used for special engineer tasks where there is a need to concentrate the explosive effect. Special explosive charge are shaped and designed to achieve a concentration of explosive forces in one direction. Shaped charges with cavity are sometimes called “Cavity charge” or “Hollow charge“. Use of the term “shaped charge” generally implies the presence of a lined cavity. Special charges include:

– Linear charges;
– Shaped linear charges;

– Shaped cone charges.

a. **Linear charges** (Figure 4.17). Linear charges are used to eliminate or destroy obstacles and barriers, pre-cast demolition charge spaces in bridge pillars and other mine cleaning operation. Linear charge sometimes called “Bangalore torpedo” is an explosive filled pipe in connectable sections which normally detonated to cut a passage through wire obstacles or mine fields.

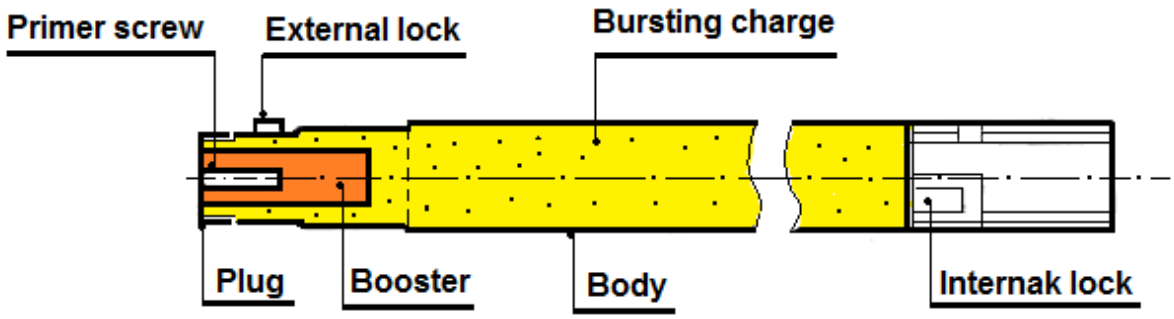


Figure 4.17

b. **Shaped linear charges** (Figure 4.18). Shaped linear charges are a semi-rigid, metal-clad container, fabricated in various lengths and widths, filled with explosive and used for linear cutting of metallic or concrete items of various thicknesses. Explosive effect is directed in longitudinal axis. They can have metal liner (Mohaupt effect) or are without metal liner (Munroe effect).

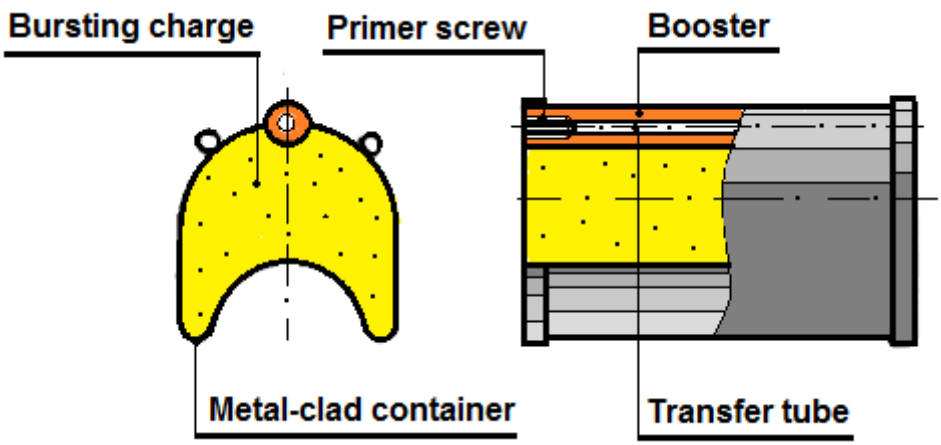


Figure 4.18

c. Shaped cone charges (Figure 4.19). Shaped cone charges are a semi-rigid, metal-clad container, fabricated in circular conic shape, and filled with explosive and metal conic liner, used for piercing of metallic or concrete items of various thicknesses. Explosive effect is directed in the long axis.

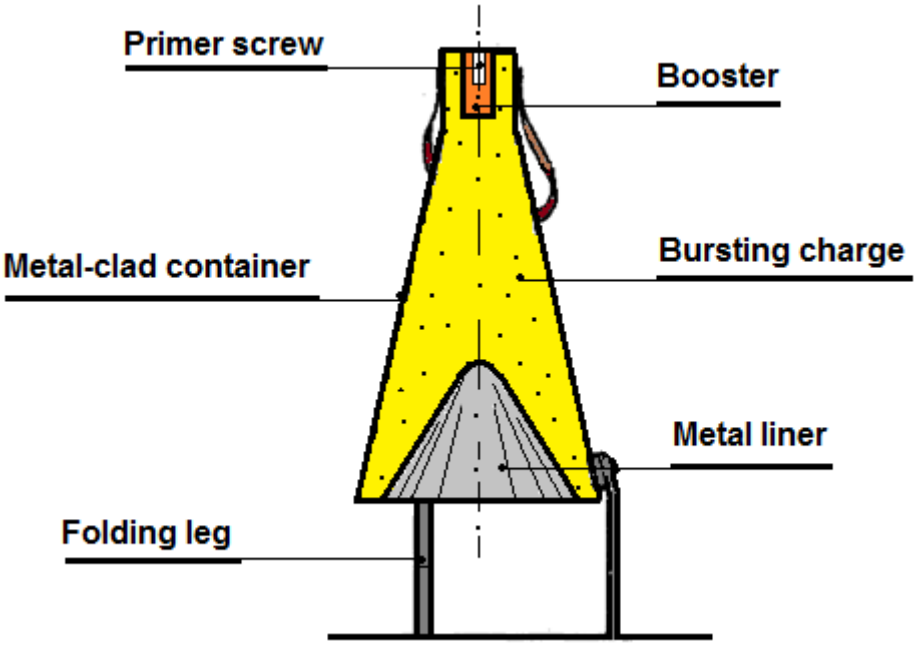


Figure 4.19

0407. **MINE CLEARING EXPLOSIVE EQUIPMENT**

1. **Characteristics.** The military priority is to breach the minefield quickly in order to create a safe path for troops. The methods of breaching include mechanical demining, carpet firing, burning of the land or the use of Bangalore torpedoes or mine-clearing line charges. Carpet firing requires special demining ammunition (Figure 4.20) which detonates above the ground in predefined height (0.3m) and destroys mines by shock wave.

a. **Construction.** Demining projectile consists of body, bursting charge, stabilizer and fuze.

1. **Body**. Body of demining projectile is made of made of a welded steel case.

2. **Bursting charge**. Body is filled by cast mixture of TNT, RDX and AL (THAF2).

3. **Fuze**. Piezoelectric, nose impact fuze with self-destruction.

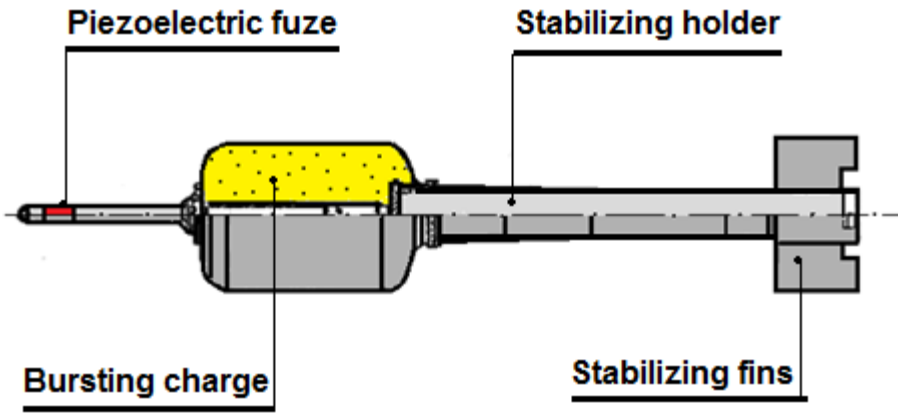

Piezoelectric fuze
Stabilizing holder
Bursting charge
Stabilizing fins

Figure 4.20

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CHAPTER 5
MARKING AND COLOUR OF AMMUNITION

0501. **BASIC METHODS OF MARKING AND COLOUR**

1**. General description.** To eliminate confusion of different varieties of ammunition or their parts, ammunition is marked by conventional signs, colour and symbols. The purpose is to facilitate the identification of the use, the effect produced and potential hazard in any situation as well as for quality and logistical reasons, tactical reasons and accident prevention. Marking and colour of ammunition is important as well as for forensic and intelligence purposes. The marks and symbols can be:

- Permanent inscription;
- Temporary inscription;
- Labelling.

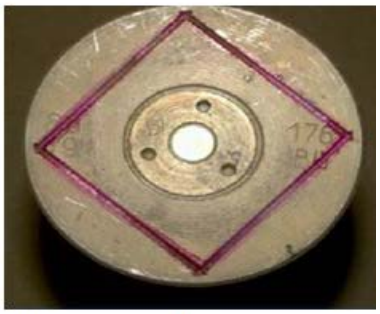
2. **Permanent inscription** (Figure 5.1) is on the outer surface of the projectile and cartridge case. Methods of permanent inscription include:

- Engraving;
- Casting;
- Stamping;
- Hammering.

Engraved

Casted

Stamped



Hammered

Figure 5.1

3. Temporary inscription (Figure 5.2). Non-permanent inscription is described on outer of projectile, cartridge and packaging. Methods of temporary inscription include:

- Writing;
- Painting;
- Printing.

Figure 5.2

4. **Labelling** (Figure 5.3). This method is used mostly to mark ammunition packing, wrapping and containers, however a projectile and cartridge can be labelled by this method as well.

0502. **MARKING OF HAND GRENADES**

1. **General description.** The marking of hand grenades varies from country to country but also depends on types of grenades. Markings are different in colour, location and content. Colour of a grenade body is mostly olive or black but other colours are also possible.

2. **Description**. Colour inscriptions are usually on the cylindrical body or on top of the grenade (Figure 5.3). The fuze is often marked on the top of the fuze lever by engraving (Figure 5.4). Content of inscription can include:

- Type of the grenade;
- Symbol of filling /manufacturing factory;
- Series and year of production;
- Type of explosive;
- Series and year of manufacture of explosive;

- Type of fuze;
- Series and year of production.

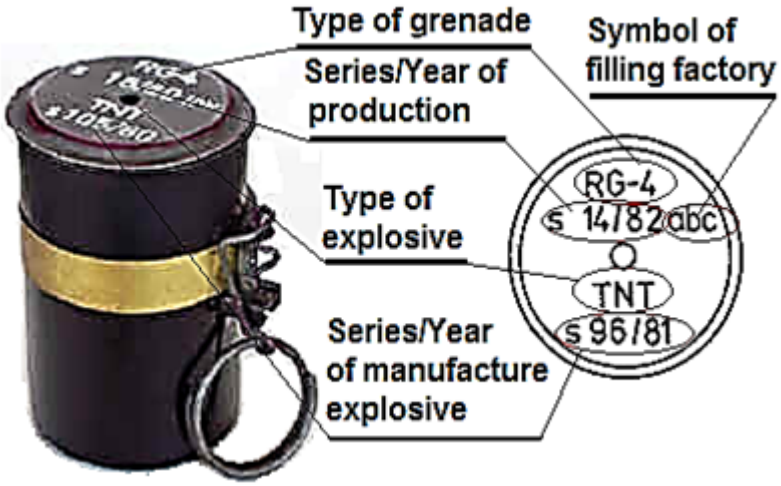


Figure 5.3

0503**. MARKING OF LIGHT ANTITANK WEAPON**

1. **General description.** Marking of light antitank weapon consists of warhead inscription, rocket engine inscription and propelling charge inscription (Figure 5.4). The priming coat for the body is olive with black letters on it.

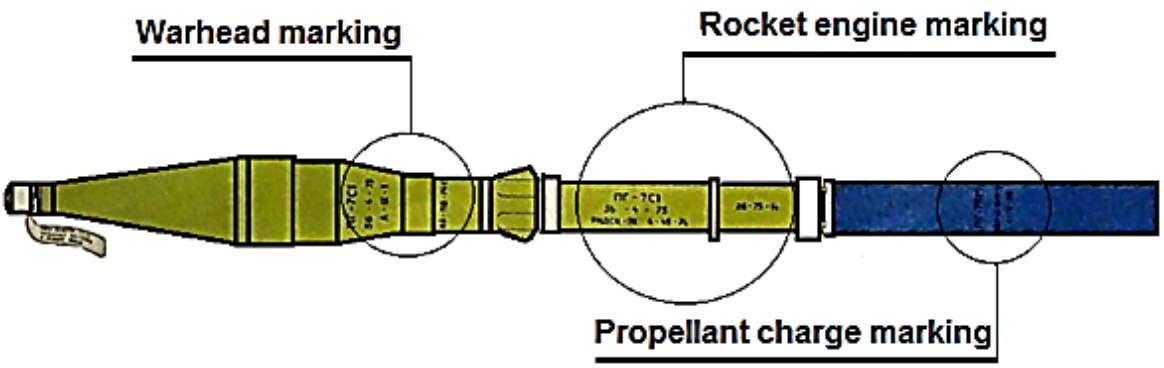
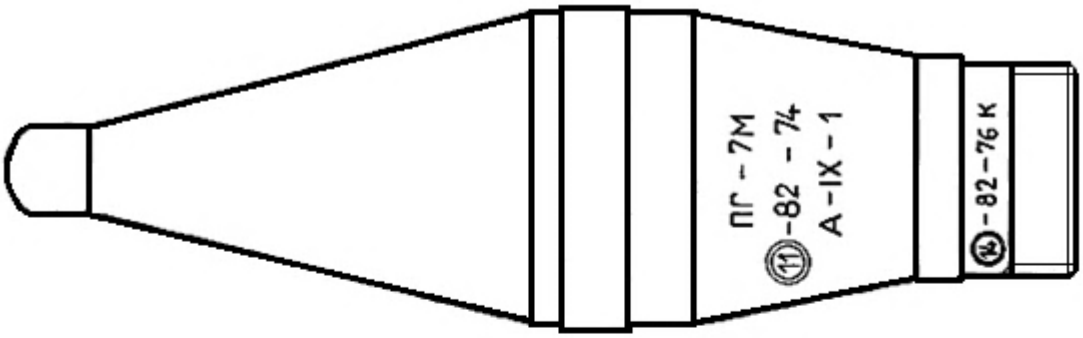


Figure 5.4

2. **Warhead marking.** Marking is in red colour. At the ogive part of warhead is placed information about assembling of shaped charges warhead. Information about production of mechanical part is found at the cylindrical part of warhead (Figure 5.5).



Ogive part: Marking of shaped charge

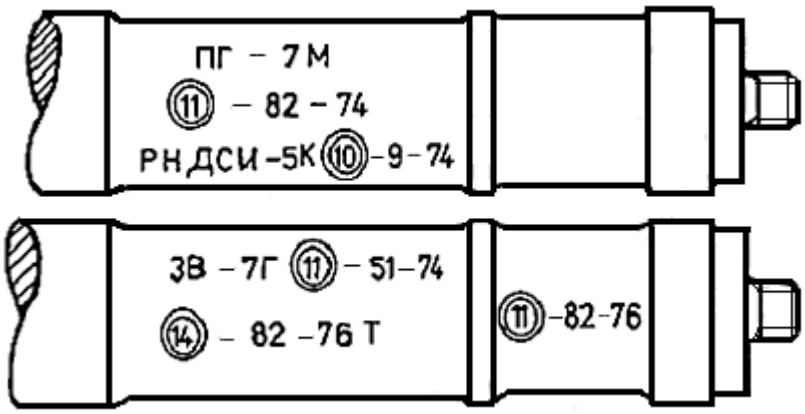
- **ПГ- 7М** - Identification of shaped charge;
- **11** - Number of producer;
- **82** - Filled serial number;
- **74** - Year of filling;
- **A-IX-1** - Symbols of explosive.

Cylindrical part: Marking of mechanical part

- **14** - Number of producer ;
- **82** - Serial number of production;
- **76** - Year of production;
- **K** - Number of meltage

Figure 5.5

3. **Rocket engine**. Information about rocket engine is described on the both sides of rocket tube. On the left side there is information about the propellant used in the engine and on the right side about any pyrotechnic delay incorporated (Figure 5.6).



Left side: Marking of rocket engine

- **ПГ- 7М** - Identification;
- **(11) -82-74** - Number of assembly factory, series and year of assembling of rocket motor;
- **РНДСИ-5К** - Symbol of powder;
- **(10) -9-74** - Number of propellant producer, serial number of propellant and year of production.

Right side: Marking of pyrotechnics delay

- **ЗВ- 7В** - Identification;
- **(11) -51-74** - Number of producer, serial number and year of production;
- **(11) -82-76** - Number of igniter powders producer, serial number and year of production;
- **(14) -82-16Т** - Number of mechanical part producer, serial number.

Figure 5.6

4. **Propelling charge** (Figure 5.7). Launch motors are marked:

- **ПГ-7ПМ** - Propelling charge identification;
- **НВЛ-42** - Sign of powder;
- **3-76- (10)** - Serial number, year of production, producer's number;
- **22-76- (10)** - Serial number, year of production, number of propelling charge producer.

Figure 5.7

0504. **MARKING OF ARTILLERY AMMUNITION**

1. **General description.** Marking and colour coding of projectiles serves to identify the use, effect produced and hazard potential of ammunition used by FWP forces. The term “marking” includes basic overall colour, role, and hazard coding colours, as well as discriptive markings and symbols which identify the ammunition and identify any special characteristics.

2. **Marking system for projectile identification**. Artillery projectile are marked with permanent and temporary inscriptions.

a. **Permanent inscriptions** are hammered (Figure 5.8) into the outside of the projectile body and usually covered by the overall body colour, which is usually olive or grey. Permanent inscriptions indicate basic information about the production and weight sign of projectile. Projectile marking has a special importance in the identification of unexploded ordnance.

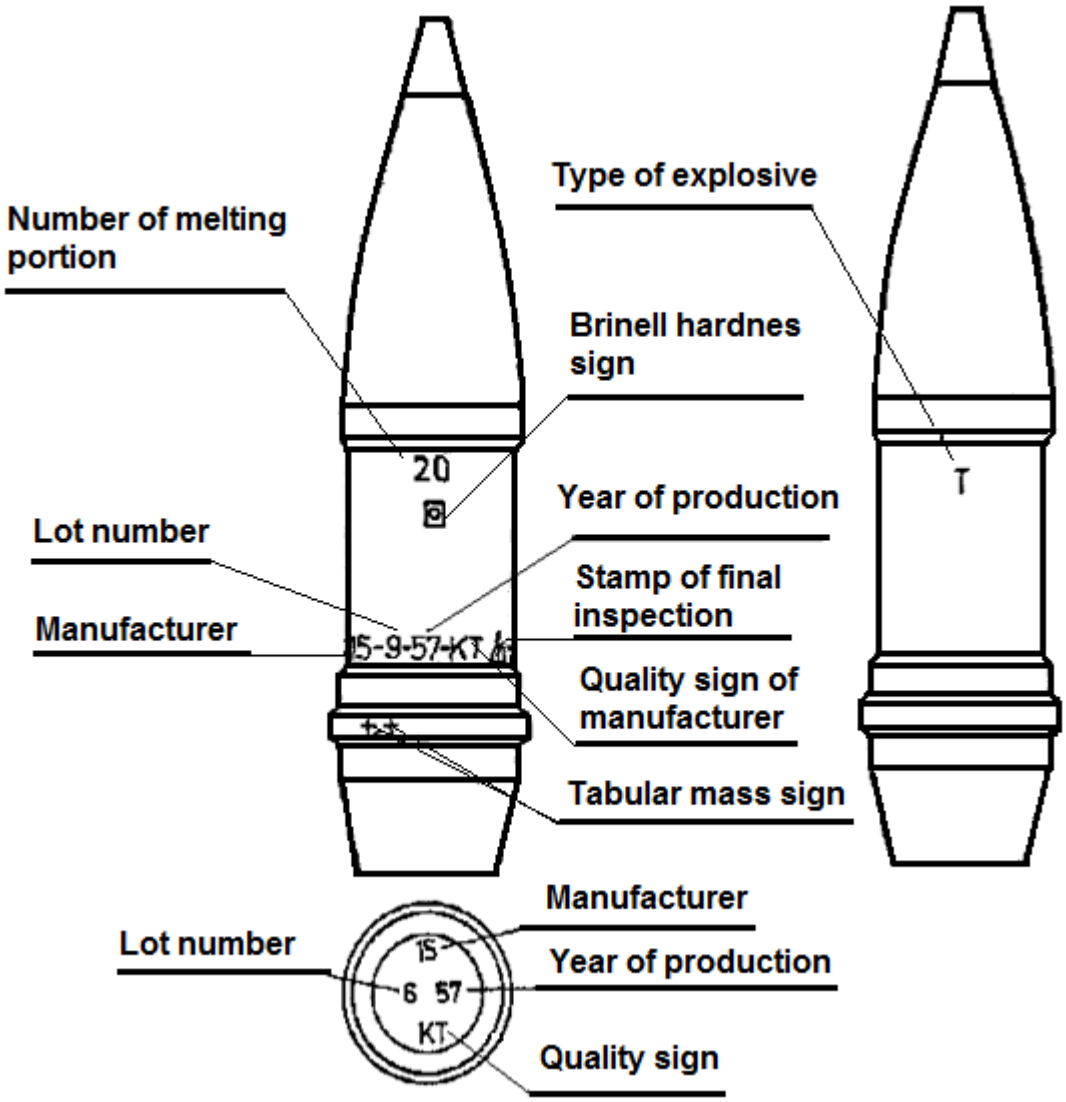


Figure 5.8

b. **Temporary inscription** are painted, drawn or printed directly onto the outer surface of the projectile body and indicate characteristics of the projectile as well as calibre, name of projectile, weight of sign and type of explosive and other features of the round (Figure 5.9).

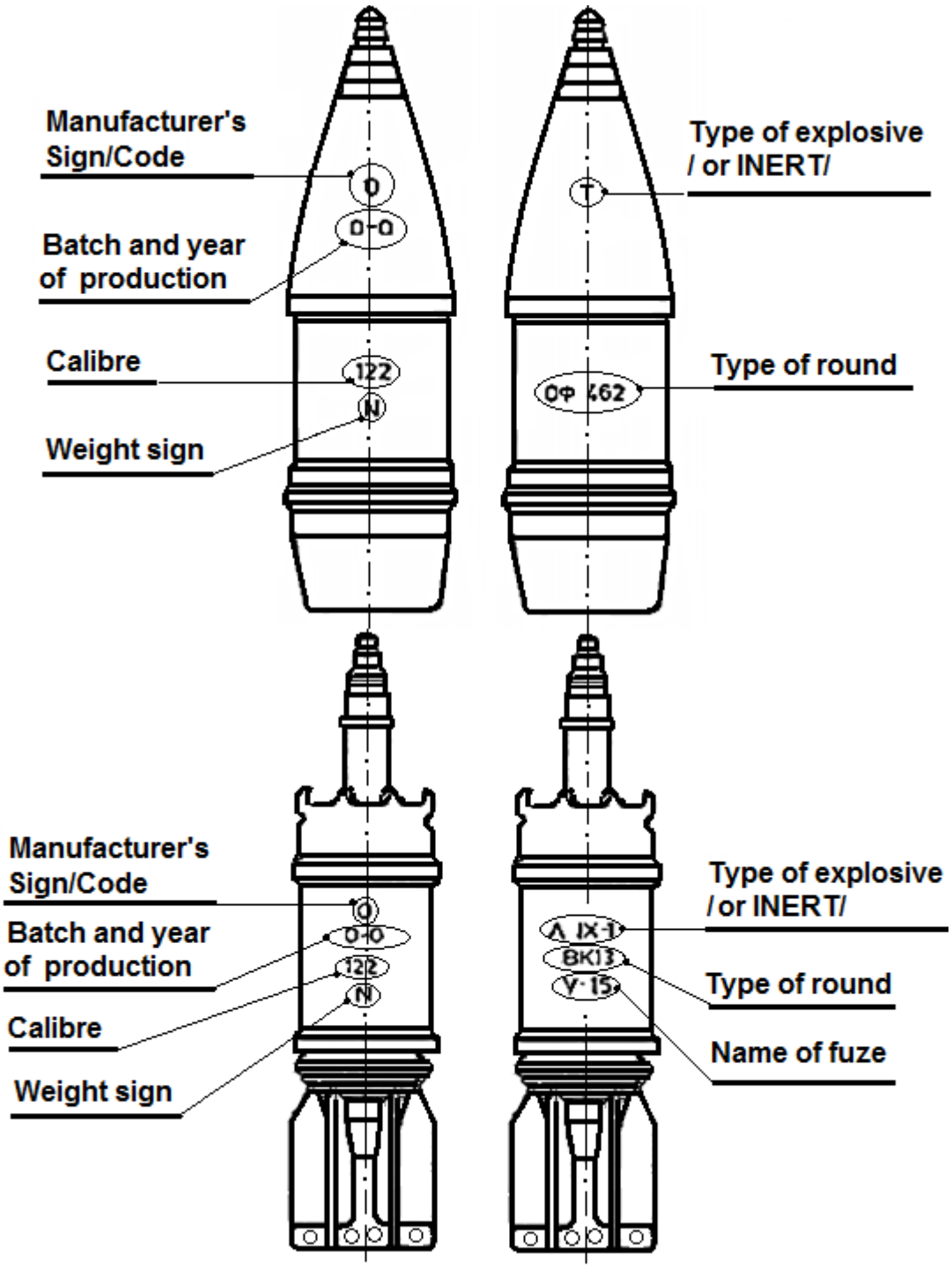


Figure 5.9

However, the type of projectile or round can be marked by a colour band under the upper bourellet or onto cylindrical part of projectile body as well (Figure 5.10).

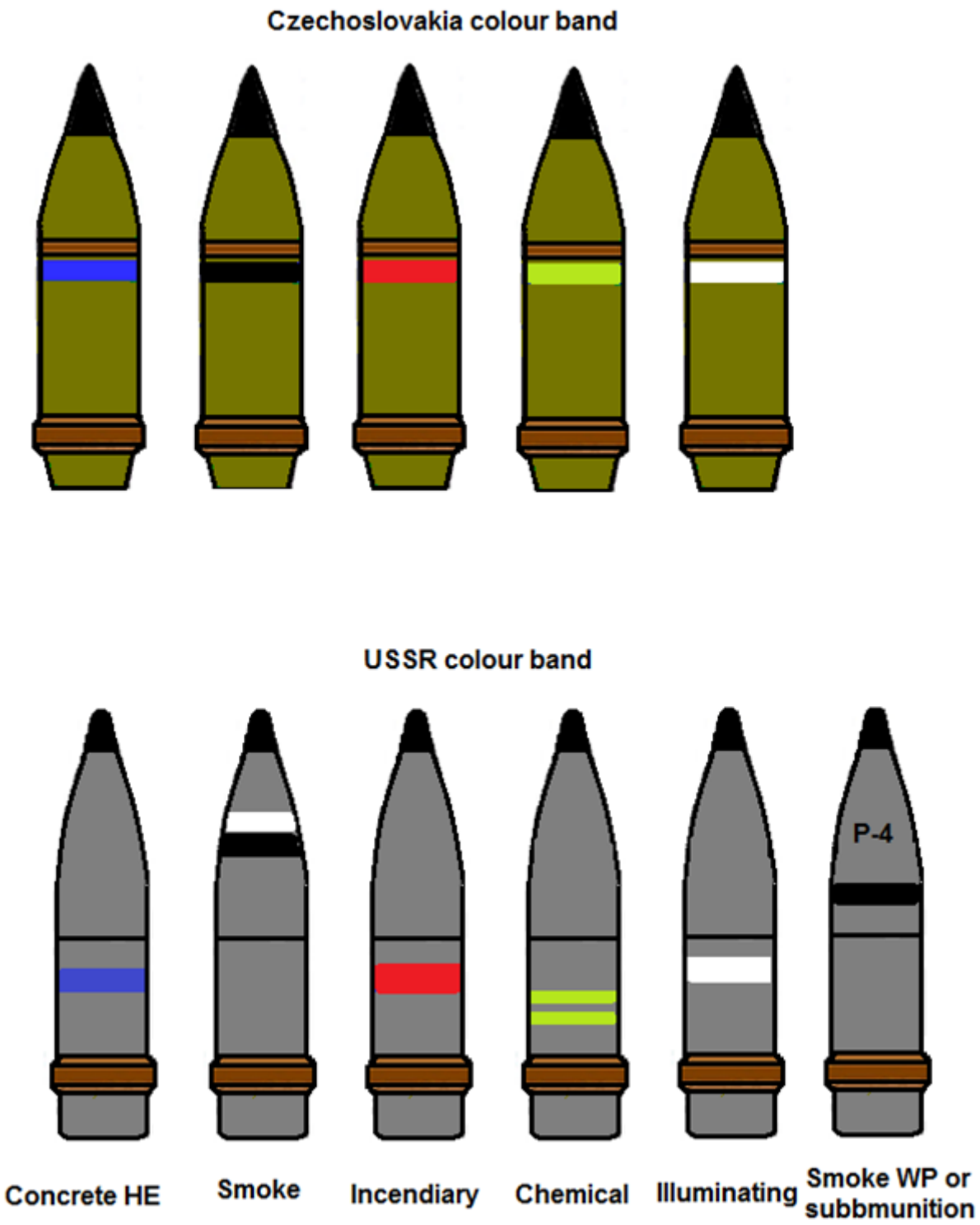


Figure 5.10

0505. **MARKING OF PROPELLING CHARGE**

1. **General description.** The marking of cased and uncased propelling charges is important for their proper use. Cased or uncased propelling charges may be identified by special feature markings and/or colours. Propellants markings are applied to the cylindrical part of cartridge case and at the bottom of the cartridge case. They are many types of propellant marking, according to the type of ammunition. Figure 5.11 shows the basic marking of fixed cartridge and in Figure 5.12 shows possible markings on separate loading propellant.

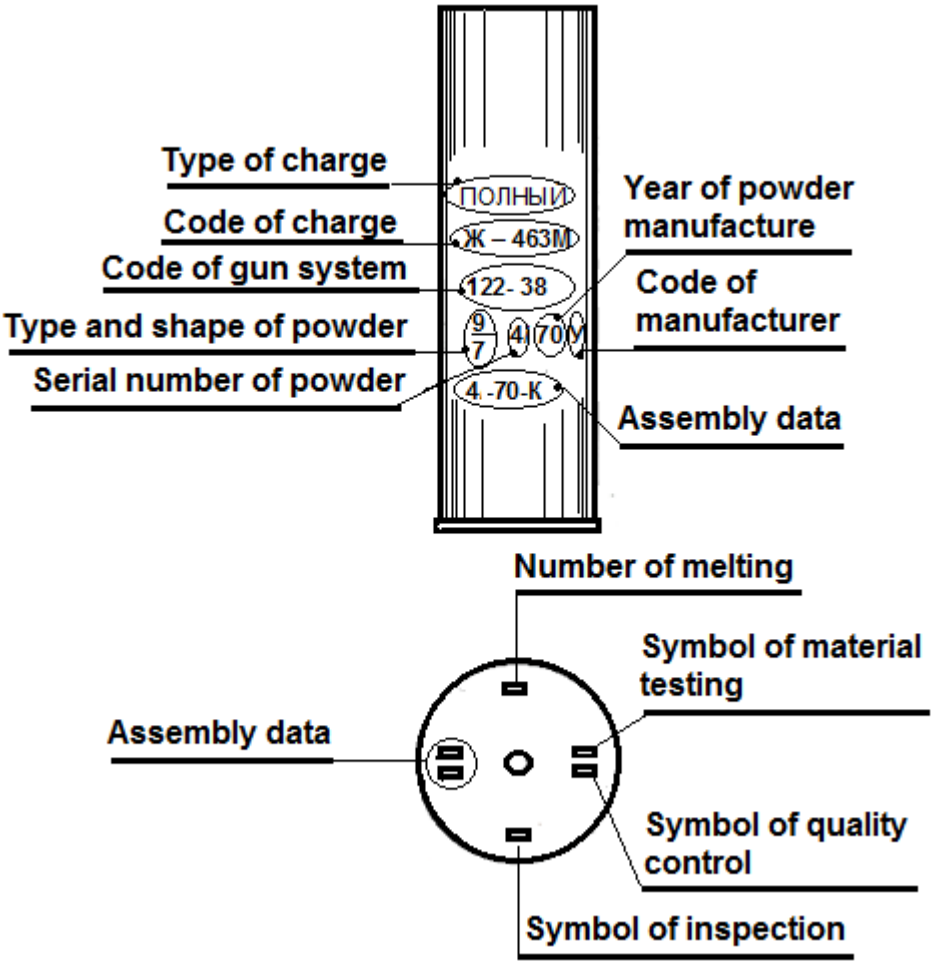


Figure 5.11

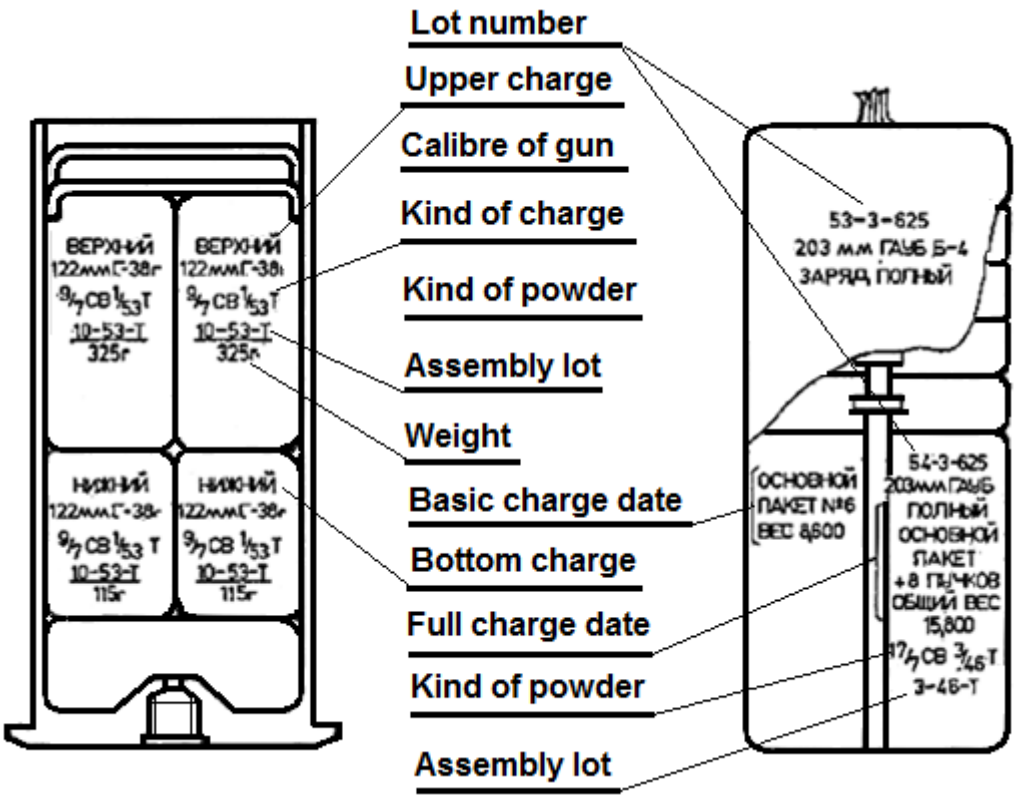


Figure 5.12

0506. MARKING OF FUZES AND SCREW PRIMERS

1. **General description**. The marking of fuzes (Figure 5.13) has a special importance in aiding positive identification and selection of appropriate render safe procedures. The marking of prime screw is important for proper use at firing and disposal of explosive remnants of war.

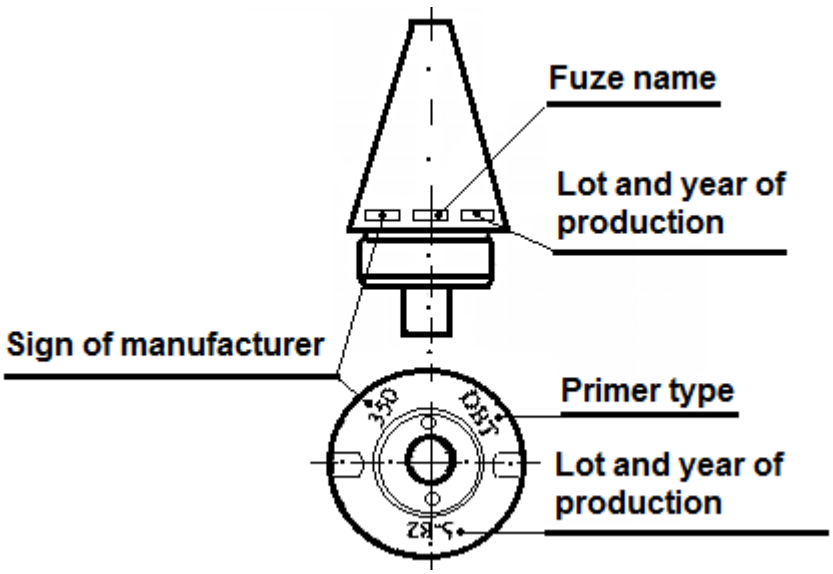


Figure 5.13

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ANNEX B: RUSSIAN ABBREVIATION

B1. USSR GENERAL ORDNANCE MARKING

Cyrillic	English	Meaning
А	A	Propaganda or Fragmentation
Б	B	Armour-Piercing
З	Z	Incendiary
Р	R	Tracer
БР	BR	Armour-Piercing, Tracer
БЗ	BZ	Armour-Piercing, Incendiary
БЗА	BZA	Armour-Piercing, Incendiary (Improved)
БЗР	BZR	Armour-Piercing, Incendiary, Tracer
БМ	BM	Armour-Piercing, Discarding Sabot (Fin or Spin stabilized)
БП	BP	HEAT, Spin Stabilized
БК	BK	HEAT, Fin Stabilized
Д	D	Smoke
ДЦ	DTs	Target Marker Smoke
О	O	Fragmentation (Oskolochno)
Ф	F	High Explosive (Fugasnyj)
ОФ	OF	Fragmentation - High Explosive
Г	G	Concrete piercing
ОГ	OG	Fragmentation (Launched Grenade)
ОФР	OFR	Fragmentation, High Explosive, Tracer
ОФЗТ	OFZT	Fragmentation, High Explosive, Incendiary, Tracer
ОР	OR	Fragmentation, Tracer
ОЗ	OZ	Fragmentation, Incendiary
ОХ	OKh	Fragmentation, Gas
ПБР	PBR	Armour-Piercing, Target Practice
ПГ	PG	HEAT (Launched grenades)
ПУ	PU	Target Practice
РПО	RPO	Infantry Flame Weapon
С	S	Illumination
СП	SP	Solid Shot, Armour Piercing
Ш	Sh	Shrapnel
Щ	Shch	Canister
Х	Kh	Gas
ИНЕРТ	INERT	Inert
МАКЕТ	MAKET	Model
ОСКОК	OSKOL	Fragmentation
ПРАКТ	PRACT	Practice

B2. USSR AMMUNITION FILLER CODES

USSR marking	Composition
А	Amatol (100% Ammonium Nitrate)
А - 40	Amatol (40% Ammonium Nitrate,60% TNT)
АТ- 40 or АТФ- 40	Amatol (40% Ammonium Nitrate,60% Pressed TNT)
А- 80	Amatol (80% Ammonium Nitrate,20% TNT)
АТ- 90	Amatol (90% Ammonium Nitrate,10% TNT)
А-IX-1	RDX 95%,Wax 5%
А-IX-2	RDX 73%, Aluminium 23%,Wax 4%
А-IX-20	RDX 78%, Aluminium 19%, Wax 3%
А-IX-П	RDX with unknown suffix
ДБ	Dinitrobenzol
ДБТ	Dinitrobenzene and TNT
Г	Hexogen (Cyclonite, RDX)
ГАИ-30	RDX 30%
М	Picric Acid
МС	TNT, Aluminium, RDX
К-1	TNT 70%, Dinitrobenzene 30%
К-2	TNT 80%, Dinitrobenzene 20%
ОКТОГЕН	HMX
ОКФОЛ or ОЛ	HMX 95%, Wax 5%
ОКТОЛ	HMX and TNT
ПВВ-5А	Plastic explosive
Т	Trotyl
Т-80	TNT-70%, RDX (Hexogen)30%
ТГ	TNT and RDX
ТГ- 30	TNT 30%, RDX 70%
ТГ- 50	TNT 50%, RDX 50%
ТГАФ- 5	TNT 40%, RDX 40%, Aluminium 20%
ТГАГ- 5	TNT 60%, RDX 20%, Aluminium 15%, Wax5%
ТД- 42	TNT 42%, Dinitronapthalene 58%
ТД- 50	TNT 50%, Dinitronapthalene 50%
ТДУ	TNT with spotting charge
ТС	TNT sulfite
Ш	Schneiderite (Ammonium nitrate 88%, Napthalene)
ШТ	Schneiderite and TNT
Р- 4	White and Yellow phosphorus
Р- 5 or Р- 74	Mustard gas (H)
РС or Р- 43	Lewisite gas (L)
РЮ	Phosgene gas (CG)
Р- 15	Adamsite gas (DM)
Р- 2	Hydrogen Cyanide gas (AC)
Р- 35	Sarin gas (GB)
Р- 55	Soman gas (GD)
РК- 7	Mustard/Lewisit mixture (H+L)

B3. TYPICAL MINE MARKING

Cyrillic	English	Meaning
МВЗ	MVZ	Mine Fuze Pressure Operated
ЯМ	YaM	Anti-Tank Mine Wooden (Old Designation)
МПМ	MPM	Mine-Bullet-Improved
ЭХЗ	EKhZ	Electric Chemical Fuze
ЧЗ	ChZ	Clockwork/Timer Fuze
МВЧ	MVCh	Clockwork Mine Fuze
УВ	UV	Pull Fuze
МВШ	MVSh	Mine Fuze Tilt-Rod
ОЗМ	OZM	Fragmentation Obstacles Mine
ТМД-Б	TMD-B	Anti-Tank Wooden cased
ЗТ	ZT	Time Fuze Igniter
МУВ	MUV	Mine Fuze Pull
ТМК	TMK	Anti-Tank Mine with Shaped charge
ПМД	PMD	Anti-Personnel Mine Wooden Cased
ПОМЗ	POMZ	Anti-Personnel Mine Obstacles
ПМН	PMN	Anti-Personnel Mine Tread Operated
ВПФ	VMF	All Ways Acting Fuze
ТМБ	TMB	Anti-Tank Mine Paper Cased
ТМ	TM	Anti-Tank Mine
МВ	MV	Mine Fuze Pressure Operated
МВМ	MVM	Mine Fuze Improved
МВН	MVN	Mine Fuze Magnetic Influence
ТМН	TMN	Anti-Tank Mine with Anti-Handling Fuze
МОН	MON	Mine Fragmentation Directional

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ANNEX C: TECHNICAL PARAMETERS OF THE SELECTED FWP AMMUNITIONS

The ammunitions list:

Annex	Original short name	English description	Page
C-1	30-JOFZ-K 2A42	30 mm Fixed Cartridge High Explosive Fragmentation Incendiary	6
C-2	30-JOSv-K 2A42	30 mm Fixed Cartridge High Explosive Fragmentation with Tracer	8
C-3	30-JPSv-K 2A42	30 mm Fixed Cartridge Armour Piercing with Tracer	10
C-4	30-JFSv-PLdvK53	30 mm Fixed Cartridge High Explosive with Tracer	12
C-5	30-JPZSv-PLdvK53	30 mm Fixed Cartridge Armour Piercing Incendiary with Tracer	14
C-6	30-JNhSv-PLdvK53	30 mm Fixed Cartridge Practice with Tracer	16
C-7	30-JPNhSv-PLdvK53	30 mm Fixed Cartridge Armour Piercing with Tracer - Practice	18
C-8	57-JO-PTK43	57 mm Fixed Cartridge High Explosive - Fragmentation	20
C-9	57-JPSv-PTK43	57 mm Fixed Cartridge Armour Piercing with Tracer	22
C-10	57-JPNhSv-PTK43	57 mm Fixed Cartridge Armour Piercing with Tracer - Practice	24
C-11	УОР-281 УОР-281У	57 mm Fixed Cartridge High Explosive Fragmentation with Tracer	26
C-12	57-JOSv-PLK S-60	57 mm Fixed Cartridge High Explosive - Fragmentation with Tracer	28
C-13	УБР-281 УБР-281У	57 mm Fixed Cartridge Armour Piercing with Tracer	30
C-14	57-JONhSv-PLK S-60	57 mm Fixed Cartridge High Explosive - Fragmentation with Tracer Practice	32
C-15	57-JOSv-PLK čs (old)	57 mm Fixed Cartridge High Explosive - Fragmentation with Tracer	34
C-16	57-JOSv-PLK čs (new)	57 mm Fixed Cartridge High Explosive - Fragmentation with Tracer	36
C-17	57-JONhSv-PLK čs	57 mm Fixed Cartridge High Explosive - Fragmentation with Tracer Practice	38
C-18	PG-15V	73 mm Separate Cartridge High Explosive Anti-Tank with Tracers	40
C-19	ОГ-15В	73 mm Separate Cartridge High Explosive Fragmentation with Tracer	42
C-20	82-JOF-BzK 59	82 mm Fixed Cartridge High Explosive - Fragmentation	44
C-21	82-JPrSv-BzK 59	82 mm Fixed Cartridge High Explosive Anti-Tank	46
C-22	82-JOFNh-BzK 59	82 mm Fixed Cartridge High Explosive - Fragmentation - Practice	48
C-23	82-JPrNhSv-BzK 59	82 mm Fixed Cartridge High Explosive Anti-Tank - Practice	50

C-24	85-JO-TK44, K52, PLK39	85 mm Fixed Cartridge High Explosive - Fragmentation	52
C-25	85-JOF-TK44, K52, PLK39	85 mm Fixed Cartridge High Explosive - Fragmentation	54
C-26	85-JPSv-TK44, K52, PLK39	85 mm Fixed Cartridge Armour Piercing with Tracer	56
C-27	85-JPPlSv-TK44, K52, PLK39	85 mm Fixed Cartridge Armour Piercing Full with Tracer	58
C-28	85-JPpSv-TK44	85 mm Fixed Cartridge Armour Piercing Rigid with Tracer	60
C-29	85-JONh-TK44, K52, PLK39	85 mm Fixed Cartridge High Explosive - Fragmentation - Practice	62
C-30	85-JPNhSv-TK44, K52, PLK39	85 mm Fixed Cartridge Armour Piercing with Tracer - Practice	64
C-31	УО-365К	85 mm Fixed Cartridge Fragmentation with Full Charge	66
C-32	УО-365К	85 mm Fixed Cartridge Fragmentation (with nose piece) with Full Charge	68
C-33	УО-367	85 mm Fixed Cartridge Fragmentation with Reduced Charge	70
C-34	УБР-365	85 mm Fixed Cartridge Armour Piercing with Blunt Tip with Tracer	72
C-35	УБР-365К	85 mm Fixed Cartridge Armour Piercing with Sharp Tip with Tracer	74
C-36	УБР-365П	85 mm Fixed Cartridge Armour Piercing Reduced Calibre with Tracer	76
C-37	85-JPSv-PLK44	85 mm Fixed Cartridge Armour Piercing with Tracer	78
C-38	85-JČ-PLK44	85 mm Fixed Cartridge Timing - High Explosive - Fragmentation.	80
C-39	85-JČNh-PLK44	85 mm Fixed Cartridge Timing - High Explosive - Fragmentation - Practice	82
C-40	100-JOF- vn-TK, K53, ShK44	100 mm Fixed Cartridge High Explosive - Fragmentation with Full Charge	84
C-41	УОФ-412	100 mm Fixed Cartridge High Explosive - Fragmentation with Full Charge	86
C-42	100-JOF-TK, K53, ShK44 mn	100 mm Fixed Cartridge High Explosive - Fragmentation	88
C-43	УОФ-412У	100 mm Fixed Cartridge High Explosive - Fragmentation with Reduced Charge	90
C-44	УБР-412	100 mm Fixed Cartridge Armour Piercing Sharp Tip with Tracer	92
C-45	УБР-412Б	100 mm Fixed Cartridge Armour Piercing with Blunt Tip with Tracer	94
C-46	УБР-412Д	100 mm Fixed Cartridge Armour Piercing with Tracer	96
C-47	100-JPSv-TK, K53, ShK44	100 mm Fixed Cartridge Armour Piercing with Tracer	98
C-48	УПБР-412	100 mm Fixed Cartridge Armour Piercing with Tracer - Practice	100
C-49	100-JPrSv-TK, K53, ShK44	100 mm Fixed Cartridge High Explosive Anti-Tank	102

C-50	100-JOFNh-TK, K53, ShK44 mn	100 mm Fixed Cartridge High Explosive - Fragmentation Practice with Reduced Charge	104
C-51	122-EOF-H 38	122 mm Separate Cartridge High Explosive - Fragmentation	106
C-52	ВБП-463	122 mm Separate Cartridge Armour Piercing with Tracer	108
C-53	ВБП-463А	122 mm Separate Cartridge Armour Piercing	110
C-54	3ВБК1	122 mm Separate Cartridge Armour Piercing with Tracer - Non-rotating Projectile	112
C-55	122-EOFNh-H 38	122 mm Separate Cartridge High Explosive - Fragmentation Practice	114
C-56	122-EOF-K 31/37	122 mm Separate Cartridge High Explosive - Fragmentation	116
C-57	УБР-471Б	122 mm Separate Cartridge Armour Piercing with Tracer	118
C-58	3ВОФ5	122 mm Separate Cartridge High Explosive - Fragmentation	120
C-59	3ВОФ6	122 mm Separate Cartridge High Explosive - Fragmentation	122
C-60	3ВБП3	122 mm Separate Cartridge Armour Piercing with Tracer - Rotating Projectile	124
C-61	3ВБК3	122 mm Separate Cartridge Armour Piercing with Tracer - Non-rotating Projectile	126
C-62	3ВБК9	122 mm Separate Cartridge Armour Piercing with Tracer - Non-rotating Projectile	128
C-63	122-EOFNh-D30, 2S1	122 mm Separate Cartridge High Explosive - Fragmentation Practice	130
C-64	3ВОФ22	125 mm Separate Cartridge High Explosive - Fragmentation	132
C-65	3ВБМ3	125 mm Separate Cartridge Armour Piercing, Fin Stabilized, Discarding Sabot- Tracer	134
C-66	3ВБМ6	125 mm Separate Cartridge Armour Piercing, Fin Stabilized, Discarding Sabot- Tracer	136
C-67	3ВБК10	125 mm Separate Cartridge Armour Piercing with Tracer	138
C-68	152-EOF-KH 37 P (old)	152 mm Separate Cartridge High Explosive - Fragmentation with Full Bag Charge No. P, 2-4	140
C-69	152-EOF-KH 37 P (new)	152 mm Separate Cartridge High Explosive - Fragmentation with Full Bag Charge No. P, 1-5	142
C-70	ВОФ-545	152 mm Separate Cartridge High Explosive - Fragmentation with Full Bag Charge No. P, 1-5	144
C-71	152-EOF-KH 37 Zm 152-EOF-mn-KH 37, H 18/47	152 mm Separate Cartridge High Explosive - Fragmentation with Reduced Bag Charge No. 6-12	146
C-72	ВОФ-545У	152 mm Separate Cartridge High Explosive - Fragmentation with Reduced Bag Charge No. 6-12	148
C-73	152-EOFNh-KH 37 P, 2-4	152 mm Separate Cartridge High Explosive - Fragmentation Practice with Full Bag Charge No. P, 2-4	150
C-74	152-EONh-KH 37	152 mm Separate Cartridge High Explosive - Fragmentation Practice with Reduced Bag Charge No. 6-12	152

C-75	82-EO-M 52	82 mm High Explosive - Fragmentation - Mortar Bomb	154
C-76	O-832	82 mm High Explosive - Fragmentation - Mortar Bomb	156
C-77	O-832Д	82 mm High Explosive - Fragmentation - Mortar Bomb	158
C-78	82-ED-M 52	82 mm Smoke Projectile - Mortar Bomb	160
C-79	Д-832	82 mm Smoke Projectile - Mortar Bomb	162
C-80	Д-832Д	82 mm Smoke Projectile - Mortar Bomb	164
C-81	82-EONh-M 52	82 mm High Explosive - Fragmentation - Mortar Bomb - Practice	166
C-82	120-EOF-M	120 mm High Explosive - Fragmentation - Mortar Bomb	168
C-83	ОФ-843Б	120 mm High Explosive - Fragmentation - Mortar Bomb	172
C-84	120-EOFd-M	120 mm High Explosive - Fragmentation - Mortar Bomb - Long-range	174
C-85	ОФ-843Б	120 mm High Explosive - Fragmentation - Mortar Bomb - Long-range	178
C-86	ВФ-864	240 mm High Explosive Mortar Bomb with Bags Charge	180
C-87	ВФ-864	240 mm High Explosive Mortar Bomb with Supercharge	182
C-88	ВФ-864	240 mm High Explosive Mortar Bomb with Special charge	184
C-89	RG-4	Offensive Hand Grenade	186
C-90	RG-F1	Defensive Hand Grenade	188
C-91	URG-86	Universal Hand Grenade	190
C-92	ВОГ-17 ВОГ-17М	Grenade	192
C-93	ВОГ-30	Grenade	194
C-94	ГПД-30	Grenade	196
C-95	PP Mi-D	Anti-Personnel Wooden Mine	198
C-96	PP Mi-D II	Anti-Personnel Wooden Mine	200
C-97	PP Mi-Sk	Anti-Personnel Fragmentation Steel Mine	202
C-98	PP Mi-Sb	Anti-Personnel Fragmentation Concrete Mine	204
C-99	PP Mi-Šr II	Anti-Personnel Bounding Fragmentation Mine in Steel Case	206
C-100	PT Mi-K	Anti-Tank Blast Mine in a Metal Case	208

C-101	PT Mi-K II	Anti-tank Mine in a Metal Case	210
C-102	PT Mi-Ba III	Anti-tank Mine in a Bakelite Body	212
C-103	PT Mi-U	Anti-tank Mine in a Bakelite Body	214
C-104	PT Mi-P	Anti-tank, Anti-bottom Mine in a Metal Case	216

	FWP Ammunition	ANNEX C-1

FIELD of AMMUNITION	*artillery*
CALIBER	*30 mm*
NAME	*30 mm Fixed Cartridge High Explosive Fragmentation Incendiary*
TYPE	*HEI-FRAG*
NAME/ASSIGNED MARK (original)	*30-JOFZ-K 2A42*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *30 mm cannon 2A42 (BMP-2),* *30 mm cannon 2A38, 2A38M (Brams of Slovakia),* *30 mm cannon 2A72 (BMP-3, БРМ-3К „Рысь“)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*30-JOFZ-K 2A42*	**abbreviation**	*30-OFZ*	**abbreviation**	---
length [*mm*]	*289 - 293*	**weight [*kg*]**	*0.389*	**type and size of propellant charge**	*6/7 P-5 BP f1*
average weight [*kg*]	*0.833*	**length [*mm*]**	*~154*		
		type of explosive	*A-IX-2*		
initial velocity of projectile [$m.s^{-1}$]	*960*	**weight of explosive [*kg*]**	*0.049*	**weight of propellant charge [*kg*]**	*0.389*
maximum range (of fire) [*m*]	*3900 - 5300*	**type of fuze**	*A-670M*		
		self-destruct time [*s*]	*7.5 - 14.5*	**length of cartridge case [*mm*]**	*165*
				material of cartridge case	*Fe*
				type of primer	*KV-30*

PACKING

Number of rounds in the crate	*3x18*	**Weight of full crate [*kg*]**	*62*

DESCRIPTION

30-OFZ is intended to be used against lightly armoured targets at ranges up to 1500 m, the 2A42 cannon is also used against low-flying aerial targets such as helicopters. The projectile consists of body (4), explosive charge (5) and fuze (3).

COLOR and MARKING

Body colour:	*Grey and red tip on fuze*
Text colour:	---

FUZE

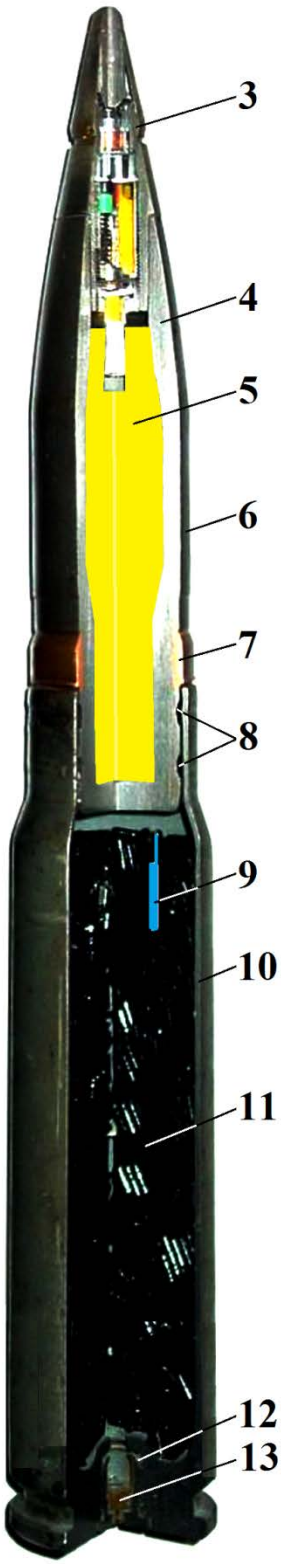
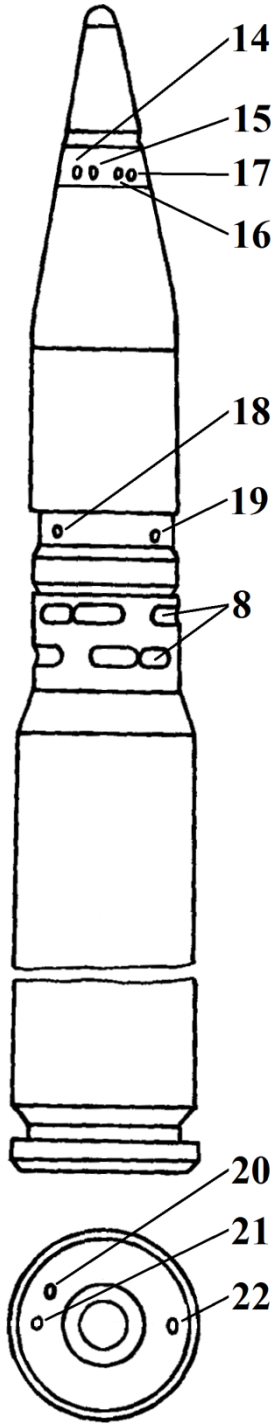
Type	Characteristic
A-670M	*Fuze - head, impact, secured with masking safety and incorporating self-destruction.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band is made from copper. The cartridge case is made of steel - surface protection zinc.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
			*1 - Projectile;* *2 - Cartridge case assembly;* *3 - Fuze;* *4 - Body of projectile;* *5 - Explosive charge;* *6 - Centring ring;* *7 - Driving band;* *8 - Cannelure;* *9 - Decoppering material;* *10 - Cartridge case;* *11 - Propellant;* *12 - Lead pad;* *13 - Primer;* *14 - Index of fuze;* *15 - Index of fuze manufacturer;* *16, 17 - Series and year of fuze production;* *18 - Index of projectile body manufacturer;* *19 - Year of projectile body production;* *20, 21 - Series and year of cartridge case production;* *22 - Index of cartridge case manufacturer*

	FWP Ammunition	ANNEX C-2

FIELD of AMMUNITION	*artillery*
CALIBER	*30 mm*
NAME	*30 mm Fixed Cartridge High Explosive Fragmentation with Tracer*
TYPE	*HE-T-FRAG*
NAME/ASSIGNED MARK (original)	*30-JOSv-K 2A42*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *30 mm cannon 2A42 (BMP-2),* *30 mm cannon 2A38, 2A38M (Brams of Slovakia),* *30 mm cannon 2A72 (BMP-3, БРМ-3К „Рысь“)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*30-JOSv-K 2A42*	**abbreviation**	*30-OSv*	**abbreviation**	---
length [*mm*]	*289 - 292*	**weight [*kg*]**	*0.385*	**type and size of propellant charge**	*6/7 P-5 BP f1*
average weight [*kg*]	*0.826*	**length [*mm*]**	*~146*		
		type of explosive	*A-IX-2*		
initial velocity of projectile [$m.s^{-1}$]	*960*	**weight of explosive [*kg*]**	*0.0116*	**weight of propellant charge [*kg*]**	*0.389*
maximum range (of fire) [*m*]	*3900 - 5300*	**type of fuze**	*A-670M*		
		self-destruct time [*s*]	*7.5 - 14.5*	**length of cartridge case [*mm*]**	*165*
				material of cartridge case	*Fe*
				type of primer	*KV-30*

PACKING

Number of rounds in the crate	*3x18*	**Weight of full crate [*kg*]**	*62*

DESCRIPTION

30-OSv is intended to be used against lightly armoured targets at ranges up to 1500 m, the 2A42 cannon is also used against low-flying aerial targets such as helicopters. The projectile consists of body (4), explosive charge (5) and fuze (3).

COLOR and MARKING

Body colour:	*Grey and green tip on fuze*
Text colour:	---

FUZE

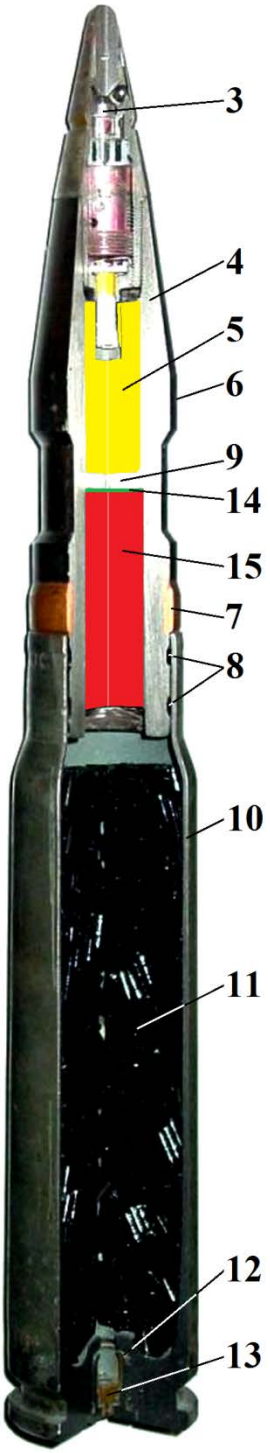
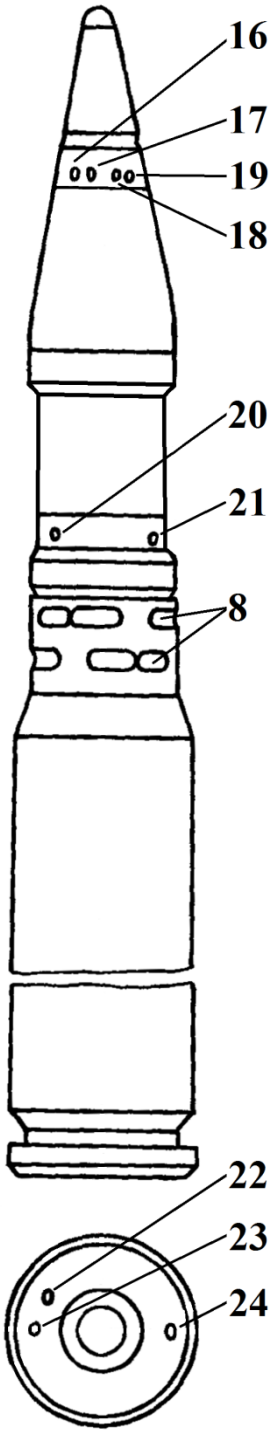
Type	Characteristic
A-670M	*Fuze - head, impact, secured with masking safety and incorporating self-destruction.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band is made from copper. The cartridge case is made of steel - surface protection zinc.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
			*1 - Projectile;* *2 - Cartridge case assembly;* *3 - Fuze;* *4 - Body of projectile;* *5 - Explosive charge;* *6 - Centring ring;* *7 - Driving band;* *8 - Cannelure;* *9 - Bulkhead;* *10 - Cartridge case;* *11 - Propellant;* *12 - Lead pad;* *13 - Primer;* *14 - Cardboard ring;* *15 - Tracer;* *16 - Index of fuze;* *17 - Index of fuze manufacturer;* *18, 19 - Series and year of fuze production;* *20 - Index of projectile body manufacturer;* *21 - Year of projectile body production;* *22, 23 - Series and year of cartridge case production;* *24 - Index of cartridge case manufacturer*

	FWP Ammunition	ANNEX C-3

FIELD of AMMUNITION	*artillery*
CALIBER	*30 mm*
NAME	*30 mm Fixed Cartridge Armour Piercing with Tracer*
TYPE	*AP-T*
NAME/ASSIGNED MARK (original)	*30-JPSv-K 2A42*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *30 mm cannon 2A42 (BMP-2),* *30 mm cannon 2A38, 2A38M (Brams of Slovakia),* *30 mm cannon 2A72 (BMP-3, БРМ-3К „Рысь“)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*30-JPSv-K 2A42*	**abbreviation**	*30-PSv*	**abbreviation**	---
length [*mm*]	*289 - 293*	**weight [*kg*]**	*0.400*	**type and size of propellant charge**	*6/7 P-5 BP f1*
average weight [*kg*]	*0.853*	**length [*mm*]**	*~154*		
		type of explosive	---		
initial velocity of projectile [$m.s^{-1}$]	*970*	**weight of explosive [*kg*]**	---	**weight of propellant charge [*kg*]**	*0.389*
direct fire range [*m*]	*1100*	**type of fuze**	---		
		armour penetration [*mm*] / angle collision [°]	*20/60*	**length of cartridge case [*mm*]**	*165*
				material of cartridge case	*Fe*
				type of primer	*KV-30*

PACKING

Number of rounds in the crate	*3x18*	**Weight of full crate [*kg*]**	*62*

DESCRIPTION

30-PSv is intended to be used against lightly armoured targets at ranges up to 1500 m, the 2A42 cannon is also used against low-flying aerial targets such as helicopters. The projectile consists of body (4), explosive charge (5) and windshield (3).

COLOR and MARKING

Body colour:	*Grey and green tip on windshield*
Text colour:	---

FUZE

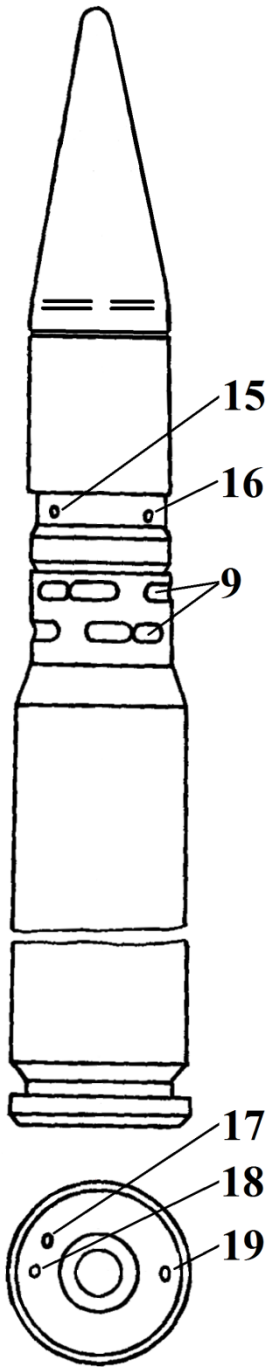
Type	Characteristic
---	---

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Driving band is made from copper. The cartridge case is made of steel - surface protection zinc.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
			*1 - Projectile;* *2 - Cartridge case assembly;* *3 - Windshield;* *4 - Body of projectile;* *5 - Centring ring;* *6 - Cardboard ring;* *7 - Tracer;* *8 - Driving band;* *9 - Cannelure;* *10 – Decoppering material* *11 - Cartridge case;* *12 - Propellant;* *13 - Lead pad;* *14 - Primer;* *15 - Index of projectile body manufacturer;* *16 - Year of projectile body production;* *17, 18 - Series and year of cartridge case production;* *19 - Index of cartridge case manufacturer.*

	FWP Ammunition	ANNEX C-4

FIELD of AMMUNITION	*artillery*
CALIBER	*30 mm*
NAME	*30 mm Fixed Cartridge High Explosive with Tracer*
TYPE	*HE-T*
NAME/ASSIGNED MARK (original)	*30-JFSv-PLdvK53*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *30 mm anti-aircraft twin-gun M1953 (30PLdvK53),* *30 mm self-propelled anti-aircraft twin-gun M1953/59 and M1953/59M (30PLdvK53/59 and 53/59M)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*30-JFSv-PLdvK53*	**abbreviation**	---	**abbreviation**	---
length [*mm*]	*331*	**weight [*kg*]**	*0.435*	**type and size of propellant charge**	*Nctp3x1.25/3.5-KF1*
average weight [*kg*]	*1.14*	**length [*mm*]**	*150*		
		type of explosive	*A-IX-2*		
initial velocity of projectile [$m.s^{-1}$]	*1000*	**weight of explosive [*kg*]**	*0.041*	**weight of propellant charge [*kg*]**	*0.185*
maximum range (of fire) [*m*]	*distance - 9700* *height - 6300*	**type of fuze**	*čz 301, čz 301a*		
				length of cartridge case [*mm*]	*220*
				material of cartridge case	*Fe*
				type of primer	*Z 1*

PACKING

Number of rounds in the crate	*40*	**Weight of full crate [*kg*]**	*63*

DESCRIPTION

30-JFSv PLdvK53 is used a engage aircraft, light armoured targets, against tanks and armoured vehicles. The projectile consists of body (1), explosive charges (12, 16, 18), fuze (10) and tracer (21).

COLOR and MARKING

Body colour:	*Yellow - fuze and body projectile and green stripe under fuze and red stripe in area of the driving band.*
Text colour:	*Black.*

FUZE

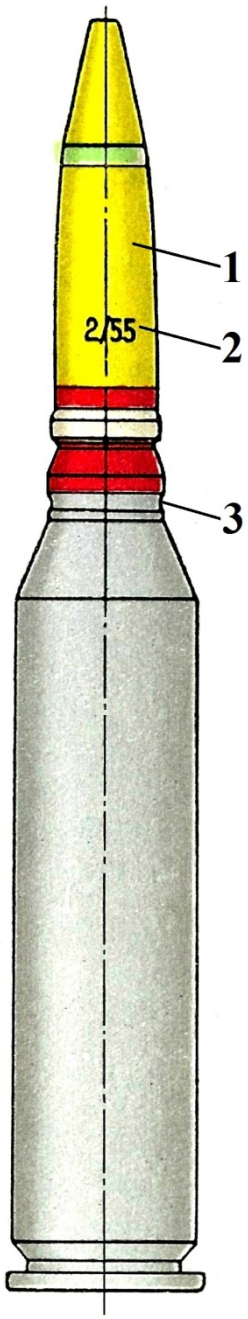
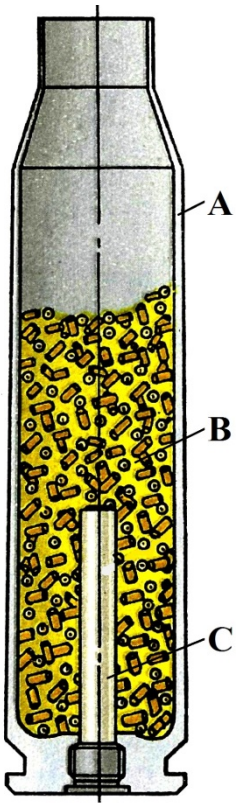
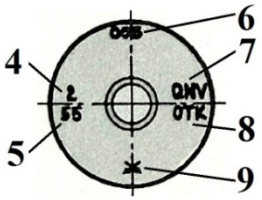
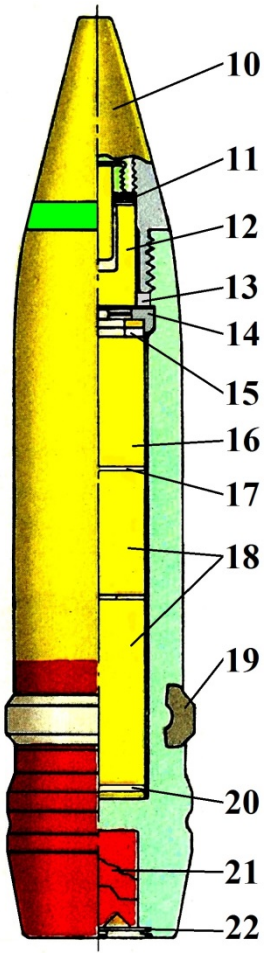
Type	Characteristic
čz 301, čz 301a	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shell. Fuzes have adjustable delay, the detonator is held as a safety feature and muzzle safety is incorporated as well as a self – destruction function.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band is made only from alloy of "FeS" (Sintered Iron). The cartridge case is made of iron - surface protection zinc.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
CARTRIDGE	CARTRIDGE CASE	PROJECTILE	
	 **BOTTOM of the cartridge case** 		*1 - Projectile;* *2 - Series/year of production of cartridge;* *3 - Crimp;* *A - Cartridge case;* *B - Propellant;* *C - Primer;* *4, 5 - Series, year of manufacture of cartridge case;* *6 - Number of melt;* *7 - Symbol of manufacturer;* *8 - Symbol of control;* *9 - Symbol of inspection;* *10 - Fuze;* *11 - Spacers (1 to 4 pcs.);* *12 - Explosive charge element;* *13 - Felt pad;* *14 - Screw cap;* *15 - Insert (1 to 2 pcs.);* *16 - Explosive charge elements;* *17 - Insert;* *18 - Explosive charge elements;* *19 - Driving band;* *20 - Bottom plate;* *21 - Tracer;* *22 – Cover.*

	FWP Ammunition	ANNEX C-5

FIELD of AMMUNITION	*artillery*
CALIBER	*30 mm*
NAME	*30 mm Fixed Cartridge Armour Piercing Incendiary with Tracer*
TYPE	*API-T*
NAME/ASSIGNED MARK (original)	*30-JPZSv-PLdvK53*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *30 mm anti-aircraft twin-gun M1953 (30PLdvK53),* *30 mm self-propelled anti-aircraft twin-gun M1953/59 and M1953/59M (30PLdvK53/59 and 53/59M)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*30-JPZSv-PLdvK53*	**abbreviation**	---	**abbreviation**	---
length [*mm*]	*331*	**weight [*kg*]**	*0.435*	**type and size of propellant charge**	*Nctp3x1.25/3.5-KF1*
average weight [*kg*]	*1.14*	**length [*mm*]**	*140*		
		type of explosive	---		
initial velocity of projectile [$m.s^{-1}$]	*1000*	**weight of explosive [*kg*]**	---	**weight of propellant charge [*kg*]**	*0.185*
maximum range (of fire) [*m*]	*distance - 9700*	**type of fuze**	---		
				length of cartridge case [*mm*]	*220*
				material of cartridge case	*Fe*
				type of primer	*Z 1*

PACKING

Number of rounds in the crate	*40*	**Weight of full crate [*kg*]**	*63*

DESCRIPTION

30-JPZSv PLdvK5 is used to engage with armour piercing and incendiary effects light armoured targets, tanks, armoured vehicles and aircraft. This projectile consists of body (14), incendiary composition (11), core (12) and tracer (17).

COLOR and MARKING

Body colour:	*Projectile is black and red tip and red stripe over the driving band.*
Text colour:	*White*

FUZE

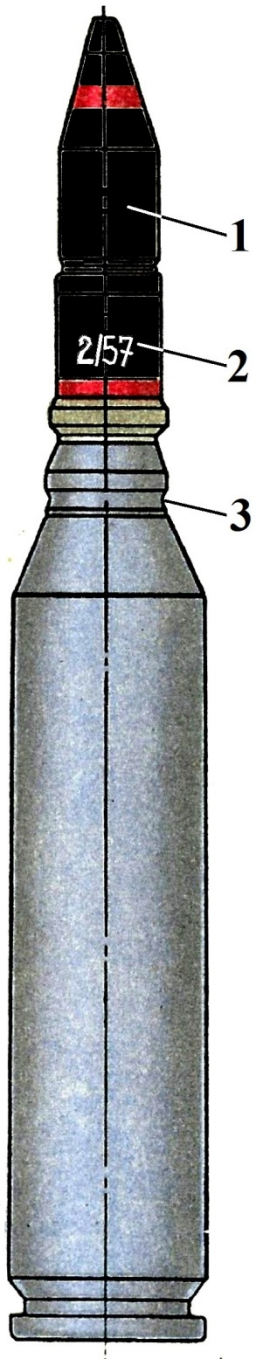
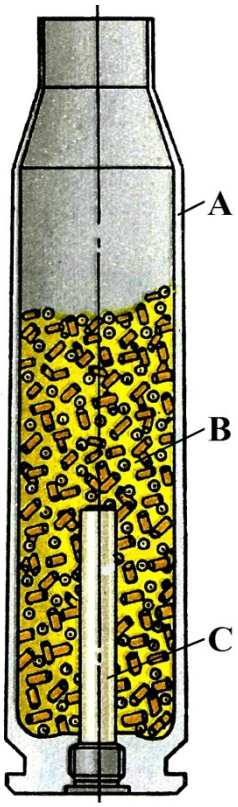
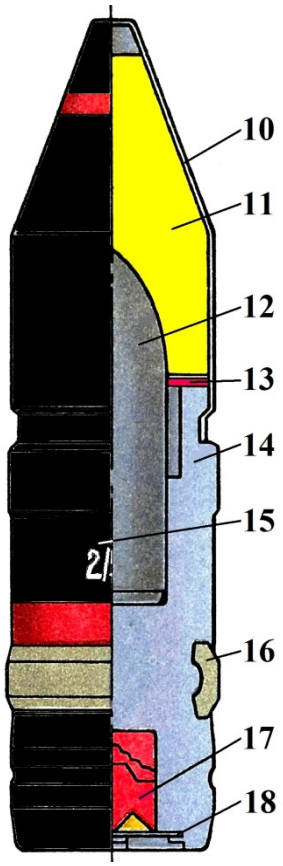
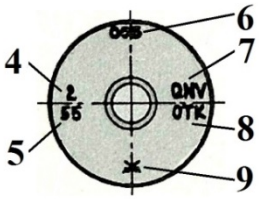
Type	Characteristic
---	---

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Driving band is made only from alloy of "FeS"(sintered iron). The cartridge case is made of steel - surface protection zinc.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
CARTRIDGE	CARTRIDGE CASE	PROJECTILE	
			*1 - Projectile - BLACK colour;* *2 - Series/year of production - WHITE colour;* *3 - Crimp;* *A - Cartridge case;* *B - Propellant;* *C - Primer;* *4, 5 - Series, year of manufacture of cartridge case;* *6 - Number of melt;* *7 - Symbol of manufacturer;* *8 - Symbol of control;* *9 - Symbol of inspection;* *10 - Jacket;* *11 - Incendiary composition;* *12 - Core;* *13 - Pad;* *14 - Body of projectile;* *15 - Series/year of production - WHITE colour;* *16 - Driving band;* *17 - Tracer;* *18 - Cover*
	BOTTOM of the cartridge case		
			

	FWP Ammunition	**ANNEX C-6**

FIELD of AMMUNITION	*artillery*
CALIBER	*30 mm*
NAME	*30 mm Fixed Cartridge Practice with Tracer*
TYPE	*TP-T*
NAME/ASSIGNED MARK (original)	*30-JNhSv-PLdvK53*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *30 mm anti-aircraft twin-gun M1953 (30PLdvK53),* *30 mm self-propelled anti-aircraft twin-gun M1953/59 and M1953/59M (30PLdvK53/59 and 53/59M)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*30-JNhSv-PLdvK53*	**abbreviation**	---	**abbreviation**	---
length [*mm*]	*331*	**weight [*kg*]**	*0.435*	**type and size of propellant charge**	*Nctp3x1.25/3.5-KF1*
average weight [*kg*]	*1.14*	**length [*mm*]**	*150*		
		type	*Inert fill*		
initial velocity of projectile [$m.s^{-1}$]	*1000*	**weight of explosive [*kg*]**	---	**weight of propellant charge [*kg*]**	*0.185*
maximum range (of fire) [*m*]	*distance - 9700*	**type of fuze**	*dummy*		
				length of cartridge case [*mm*]	*220*
				material of cartridge case	*Fe*
				type of primer	*Z 1*

PACKING

Number of rounds in the crate	*40*	**Weight of full crate [*kg*]**	*63*

DESCRIPTION

30-JNhSv PLdvK53 is used for training and testing the engagement of light armouredtargets,tanks, armoured vehicles and aircraft. This projectile consists of body (12), fuze-dummy (10), inert fill (13), driving band(15) and tracer (16).

COLOR and MARKING

Body colour:	*Body of projectile and fuze-dummy are light grey and red bar over the driving band.*
Text colour:	*Black*

FUZE

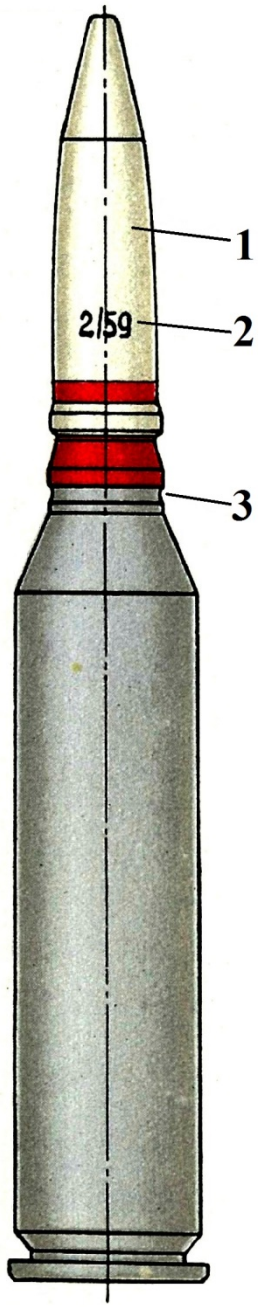
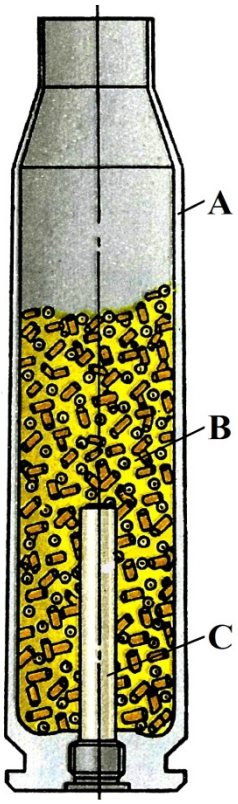
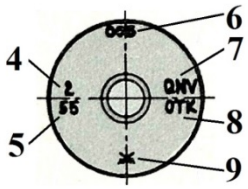
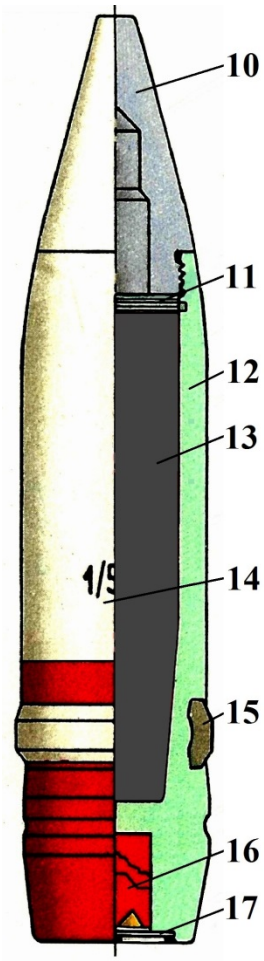
Type	Characteristic
dummy	*Fuze without explosives.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Driving band is made only from alloy of "FeS"(sintered iron). The cartridge case is made of steel - surface protection zinc.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
CARTRIDGE	CARTRIDGE CASE	PROJECTILE	
	 **BOTTOM of the cartridge case** 		*1 - Projectile (light grey colour);* *2 - Series/year of production;* *3 - Crimp;* *A - Cartridge case;* *B - Propellant;* *C - Primer;* *4, 5 - Series, year of manufacture of cartridge case;* *6 - Number of melt;* *7 - Symbol of manufacturer;* *8 - Symbol of control;* *9 - Symbol of inspection;* *10 -Fuze - dummy;* *11 - Pads;* *12 - Body;* *13 - Inert fill;* *14 - Series/year of production;* *15 - Driving band;* *16 - Tracer;* *17 - Cover*

	FWP Ammunition	**ANNEX C-7**

FIELD of AMMUNITION	*artillery*
CALIBER	*30 mm*
NAME	*30 mm Fixed Cartridge Armour Piercing with Tracer - Practice*
TYPE	*AP-T Practice*
NAME/ASSIGNED MARK (original)	*30-JPNhSv-PLdvK53*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *30 mm anti-aircraft twin-gun M1953 (30PLdvK53),* *30 mm self-propelled anti-aircraft twin-gun M1953/59 and M1953/59M (30PLdvK53/59 and 53/59M)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*30-JPNhSv-PLdvK53*	**abbreviation**	---	**abbreviation**	---
length [*mm*]	*331*	**weight [*kg*]**	*0.420*	**type and size of propellant charge**	*Nctp3x1.25/3.5-KF1*
average weight [*kg*]	*1.13*	**length [*mm*]**	*123*		
		type	---		
initial velocity of projectile [$m.s^{-1}$]	*1000*	**weight of explosive [*kg*]**	---	**weight of propellant charge [*kg*]**	*0.185*
maximum range (of fire) [*m*]	*distance - 9700*	**type of fuze**	---		
				length of cartridge case [*mm*]	*220*
				material of cartridge case	*Fe*
				type of primer	*Z 1*

PACKING

Number of rounds in the crate	*40*	**Weight of full crate [*kg*]**	*63*

DESCRIPTION

30-JPNhSv PLdvK53 is used for training and testing the engagment of light armoured targets, tanks, armoured vehicles and aircraft. This projectile consists of body (11), jacket (10) and tracer (14).

COLOR and MARKING

Body colour:	*Body of projectile is light grey and red bar over the driving band.*
Text colour:	*Black*

FUZE

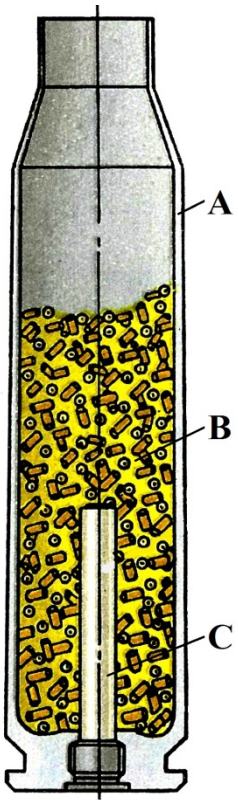
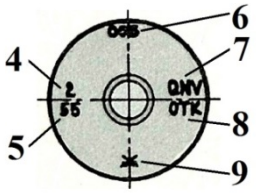
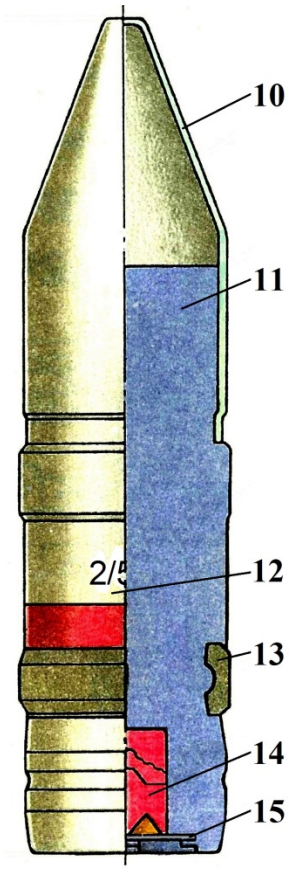
Type	Characteristic
---	---

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Driving band is made only from alloy of "FeS"(sintered iron). The cartridge case is made of steel - surface protection zinc.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
CARTRIDGE	CARTRIDGE CASE	PROJECTILE	
	 **BOTTOM of the cartridge case** 		*1 - Projectile - light grey;* *2 - Series/year of production;* *3 - Crimp;* *A - Cartridge case;* *B - Propellant;* *C - Primer;* *4, 5 - Series, year of manufacture of cartridge case;* *6 - Number of melt;* *7 - Symbol of manufacturer;* *8 - Symbol of control;* *9 - Symbol of inspection;* *10 - Jacket;* *11 - Body;* *12 - Series/year of production;* *13 - Driving band;* *14 - Tracer;* *15 - Cover*

	FWP Ammunition	**ANNEX C-8**

FIELD of AMMUNITION	*artillery*
CALIBER	*57 mm*
NAME	*57 mm Fixed Cartridge High Explosive - Fragmentation*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*57-JO-PTK43*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *57 mm anti-tank gun M1943 (57PTK43)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*57-JO-PTK43*	**abbreviation**	*57-O-PTK43*	**abbreviation**	*Nk* *57 PTK 43*
length [*mm*]	*668-673*	**weight [*kg*]**	*3.75*	**type and size of propellant charge**	*Dgtp 5x1.3/330-8.5* *or* *Nc7p 11.3x1.93/18-(12/7)*
average weight [*kg*]	*6.65*	**length [*mm*]**	*282-285*		
initial velocity of projectile [$m.s^{-1}$]	*706*	**type of explosive**	*TNT*		
maximum range (of fire) [*m*]		**weight of explosive [*kg*]**	*0.216*		
		type of fuze	*KTM-1*	**weight of propellant charge [*kg*]**	*0.895* *or* *0.92*
				weight of decoppering agent [*kg*]	*0.010*
				type of primer	*KV-4, vz. 46M*

PACKING

Number of rounds in the crate	*5*	**Weight of full crate [*kg*]**	*50*

DESCRIPTION

57-JO-PTK43 is used to engage light armoured targets, tanks and armoured vehicles. This projectile consists of the body (30), explosive charges (31) and fuze (29).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

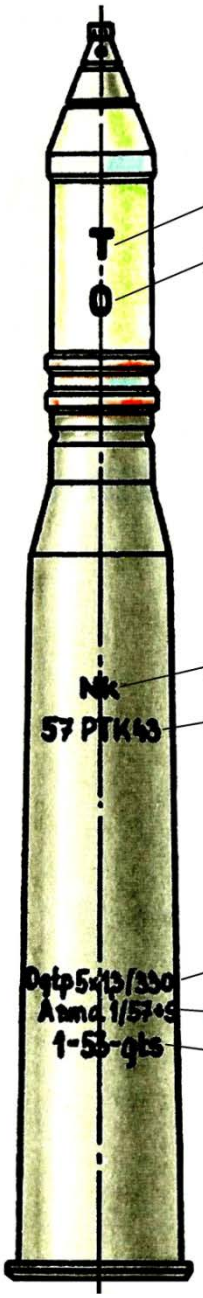
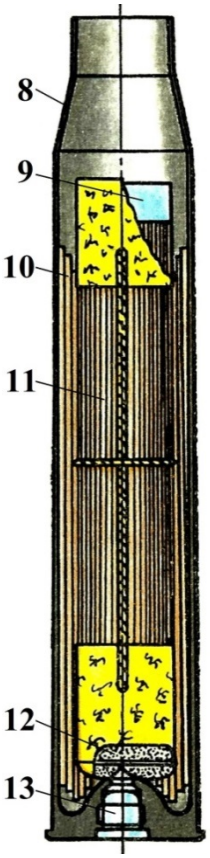
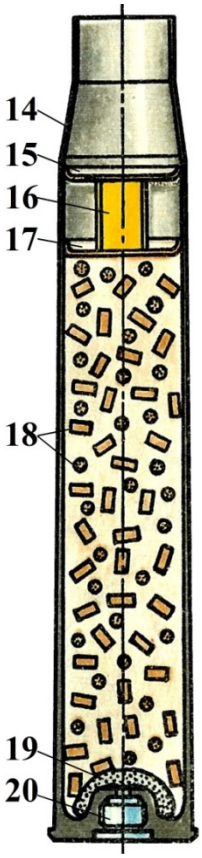
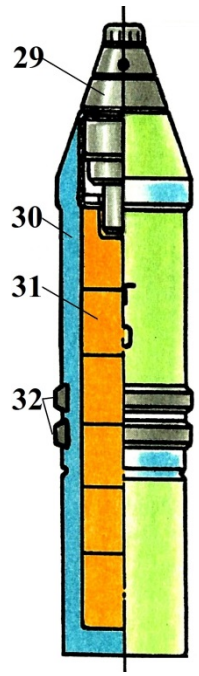
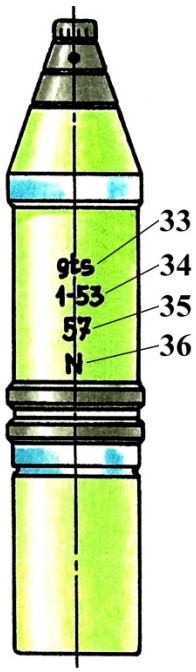
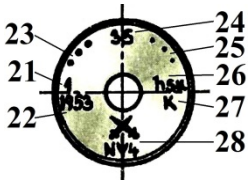
Type	Characteristic
KTM-1	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shell.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band is made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. The cartridge case is made of brass.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
	Propellant: „Dgtp“	**„Nc7p“**	
			*1 - Type of explosives;* *2 - Type of projectile - “O”* *3 - Marking of cartridge case assembly;* *4 - Marking of weapon;* *5 - Marking of powder (type, shape, dimension);* *6 - Type of black powder in igniter, index of manufacturer, series/year of manufacture of black powder and type of decoppering agent;* *7 - Series-year of production and symbol of filling factory;* *8 - Cartridge case;* *9 - Decoppering agent;* *10 - Propellant - free;* *11 - Propellant - bunch;* *12 - Igniter;* *13 - Primer;* *14 - Cartridge case;* *15 - Upper cover;* *16 - Tube expansion - spacer;* *17 - Bottom cover;* *18 - Propellant;* *19 - Igniter;* *20 - Primer;* *21, 22 - Series, year of manufacture of cartridge case;* *23 - Number of calibration;* *24 - Number of melt;* *25 - Number of shots;* *26 - Symbol of manufacturer of cartridge case;* *27 - Symbol of control;* *28 - Symbol of inspection;* *29 - Fuze;* *30 - Body of projectile;* *31 - Explosive charges;* *32 - Driving bands;* *33 - Symbol of manufacturer of projectile;* *34 - Series and year of production of projectile;* *35 - Calibre;* *36 - Weight sign.*
BOTTOM of the cartridge case			
			

FWP Ammunition

ANNEX C-9

FIELD of AMMUNITION	*artillery*
CALIBER	*57 mm*
NAME	*57 mm Fixed Cartridge Armour Piercing with Tracer*
TYPE	*AP-T*
NAME/ASSIGNED MARK (original)	*57-JPSv-PTK43*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *57 mm anti-tank gun M1943 (57PTK43)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*57-JPSv-PTK43*	**abbreviation**	*57-PSv-PTK43*	**abbreviation**	*Nk* *57 PTK 43*
length [*mm*]	*676-682*	**weight [*kg*]**	*3.14*	**type and size of propellant charge**	*Dgtp 5x1.5/240-8.5 +* *Dgtp 5x1.5/130-8.5 or* *Ngtp 5x1.5/240-8.5 +* *Ngtp 5x1.5/130-8.5 or* *Nc7p 11.3x2/18-(14/7)* *without igniter*
average weight [*kg*]	*6.60*	**length [*mm*]**	*259-265*		
initial velocity of projectile [$m.s^{-1}$]	*990*	**type of explosive**	*H10* *A-IX-2*		
maximum range (of fire) [*m*]		**weight of explosive [*kg*]**	*H10 - 0.018* *A-IX-2 - 0.014*		
		type of fuze	*MD-10*	**weight of propellant charge [*kg*]**	*0.97+0.49 or* *0.97+0.49 or* *1.45*
				weight of decoppering agent [*kg*]	*0.015-0.020*
				type of primer	*KV-4*

PACKING

Number of rounds in the crate	*5*	**Weight of full crate [*kg*]**	*43*

DESCRIPTION

57-JPSv-PTK43 is to engage tanks, armoured vehicles and reinforced concrete objects. This projectile consists of a body (37), windshield (36), and explosive charge (38). Body is made from hard steel. The fuze (41)is located at the rear with a tracer (42).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
MD-10	*Fuze is inserted into the bottom of the shell and is armed by inertial forces during the flight of the shot to the target.*

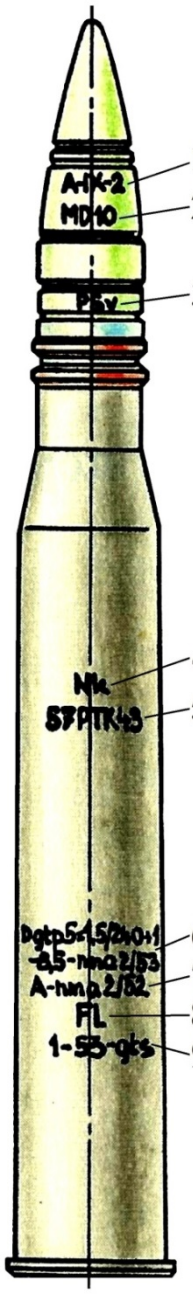
SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

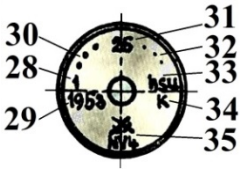
NOTICE

Driving band is made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. The cartridge case is made of brass. Cartridge cases filled with Nc7p propellant do not have an igniter

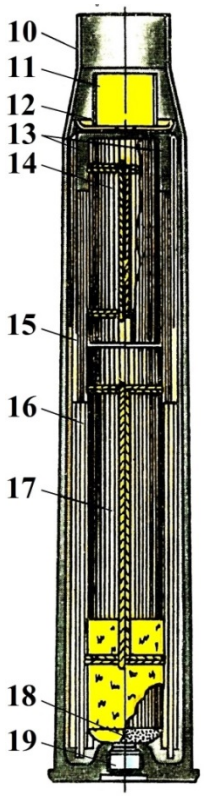
DRAWINGS/CUTAWAY/MARKING/STENCILING:



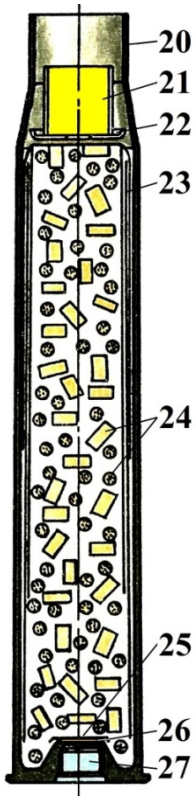
BOTTOM
of the cartridge case

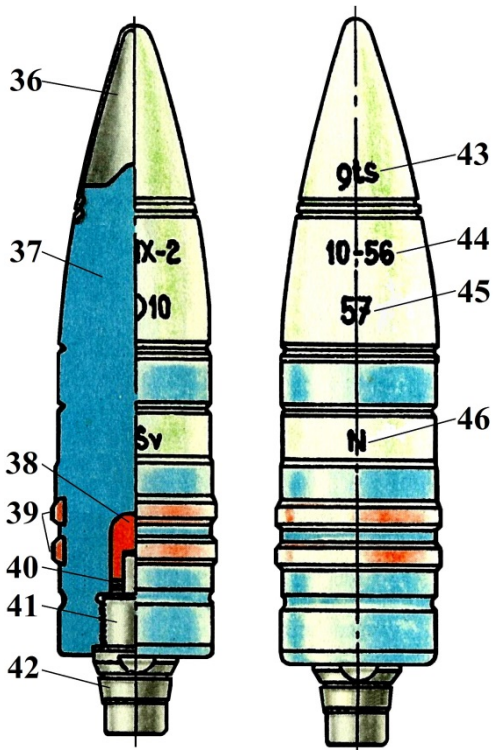


Propellant: „Dgtp“



„Nc7p“





LEGEND

1 - Type of explosive;
2 - Type of fuze;
3 - Type of projectile;
4 - Marking of cartridge case assembly;
5 - Marking of weapon;
6 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder;
7 - Type of black powder in igniter, index of manufacturer, series/year of manufacture of black powder;
8 - Marking of flash reducing agent;
9 - Series-year of production and symbol of filling factory;
10 - Cartridge case;
11 - Tube expansion - spacer;
12 - Cover;
13 - Flash reducing agent;
14 - Upper propellant - bunch;
15 - Upper propellant - free;
16 - Bottom propellant - free;
17 - Bottom propellant - bunch;
18 - Igniter;
19 - Primer;
20 - Cartridge case;
21 - Tube expansion - spacer;
22 - Cover;
23 - Flash reducing agent;
24 - Propellant;
25 - Disc from “mitkal”;
26 - Label charge;
27 - Primer;
28, 29 - Series, year of manufacture of cartridge case;
30 - Number of calibration;
31 - Number of melt;
32 - Number of shots;
33 - Symbol of manufacturer of cartridge case;
34 - Symbol of control;
35 - Symbol of inspection;
36 - Windshield;
37 - Body of shell;
38 - Explosive charge;
39 - Driving bands;
40 - Cardboard pads;
41 - Fuze;
42 - Tracer;
43 - Symbol of manufacturer of projectile;
44 - Series - year of manufacture of projectile;
45 - Calibre;
46 - Weight sign

	FWP Ammunition	**ANNEX C-10**

FIELD of AMMUNITION	*artillery*
CALIBER	*57 mm*
NAME	*57 mm Fixed Cartridge Armour Piercing with Tracer - Practice*
TYPE	*AP-T Practice*
NAME/ASSIGNED MARK (original)	*57-JPNhSv-PTK43*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 57 mm anti-tank gun M1943 (57PTK43)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*57-JPSv-PTK43*	**abbreviation**	*57-PSv-PTK43*	**abbreviation**	*Nk 57 PTK 43*
length [*mm*]	*676-682*	**weight [*kg*]**	*3.14*	**type and size of propellant charge**	*Ngtp 5x1.5/240-8.5 + Ngtp 5x1.5/130-8.5 or Nc7p 11.3x2/18-(14/7)*
average weight [*kg*]	*6.60*	**length [*mm*]**	*259-265*		
initial velocity of projectile [$m.s^{-1}$]	*990*	**type of explosive**	---		
maximum range (of fire) [*m*]		**weight of explosive [*kg*]**	---		
		type of fuze	*MD-10Nh - dummy*	**weight of propellant charge [*kg*]**	*0.97+0.49 or 1.45*
				weight of decoppering agent [*kg*]	*0.015-0.020*
				type of primer	*KV-4*

PACKING

Number of rounds in the crate	*5*	**Weight of full crate [*kg*]**	*43*

DESCRIPTION

57-JPNhSv-PTK43 is used for training and testing the engagement of tanks, armoured vehicles and reinforced concrete objects. This projectile consists a of body (37), windshield (36), inert material (38). Body is made from hard steel. At the rear is located a fuze - Practice (41) and tracer (42).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
MD-10Nh - dummy	*Fuze without explosives.*

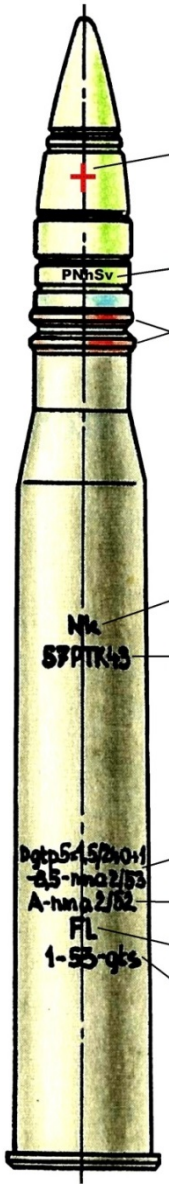
SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

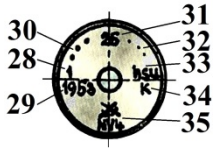
NOTICE

Driving band is made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. The cartridge case is made of brass. Cartridge cases filled with Nc7p do not have an igniter.

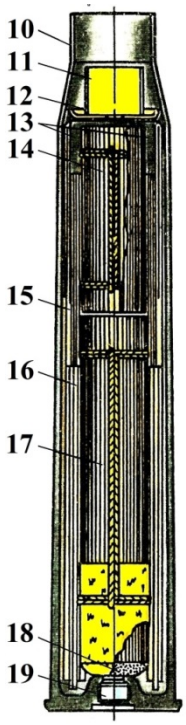
DRAWINGS/CUTAWAY/MARKING/STENCILING



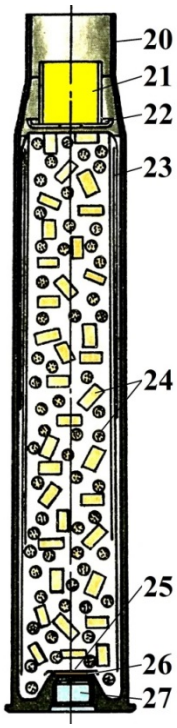
BOTTOM
of the cartridge case

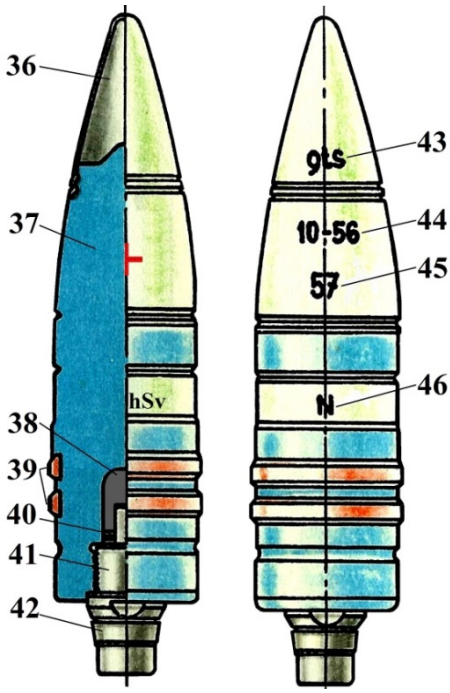


Propellant: „Dgtp“



„Nc7p“





LEGEND

1 - Type of projectile - red cross = Practice 2 - Type of projectile - “PNhSv”
3 - Driving bands;
4 - Marking of cartridge case assembly; 5 - Marking of weapon;
6 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder;
7 - Type of black powder in igniter, index of manufacturer, series/year of manufacture of black powder;
8 - Marking of flash reducing agent;
9 - Series-year of production and symbol of filling factory;
10 - Cartridge case;
11 - Tube expansion - spacer;
12 - Cover;
13 - Flash reducing agent;
14 - Upper propellant - bunch;
15 - Upper propellant - free;
16 - Bottom propellant - free;
17 - Bottom propellant - bunch;
18 - Igniter;
19 - Primer;
20 - Cartridge case;
21 - Tube expansion - spacer;
22 - Cover;
23 - Flash reducing agent;
24 - Propellant;
25 - Disc from “mitkal”;
26 - Label charge;
27 - Primer;
28, 29 - Series, year of manufacture of cartridge case;
30 - Number of calibration;
31 - Number of melt;
32 - Number of shots;
33 - Symbol of manufacturer of cartridge case;
34 - Symbol of control;
35 - Symbol of inspection;
36 - Windshield;
37 - Body of shell;
38 - Inert material;
39 - Driving bands;
40 - Cardboard pads;
41 - Fuze;
42 - Tracer;
43 - Symbol of manufacturer of projectile;
44 - Series - year of manufacture of projectile;
45 - Calibre;
46 - Weight sign.

	FWP Ammunition	ANNEX C-11

FIELD of AMMUNITION	*artillery*
CALIBER	*57 mm*
NAME	*57 mm Fixed Cartridge High Explosive Fragmentation with Tracer*
TYPE	*HE-FRAG-T*
NAME/ASSIGNED MARK (original)	*УОР-281 and УОР-281У*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 57 mm anti-aircraft gun M S-60 (57 PLK S-60)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УОР-281 УОР-281У*	**abbreviation**	*ОР-281*	**abbreviation**	*УОР-281 57-С-60*
average weight [*kg*]	*6.61*	**weight [*kg*]**	*2.85*	**type and size of propellant charge**	*11/7 СВ*
		length [*mm*]	*220*		
length [*mm*]	*530 - 534*	**type of explosives**	*А-IX-2*		
initial velocity of projectile [$m.s^{-1}$]	*960*	**weight of blasting filler [*kg*]**	*0.153*	**weight of propellant charge [*kg*]**	*1.2*
maximum range (of fire) [*m*]	*12000*	**type of fuze**	*МГ-57, МГЗ-57*	**material of cartridge case**	*Ms (brass)*
				length [*mm*]	*348*
				type of primer	*КВ-5У*

PACKING

Number of rounds in the crate	*5*	**Weight of full crate [*kg*]**	*48*

DESCRIPTION

УОР-281 or УОР-281У are used to engage light armoured targets, tanks, armoured vehicles and aircraft. This projectile consists of body (12), explosive charge (14), fuze (25), Driving bands (15) and tracer (16).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

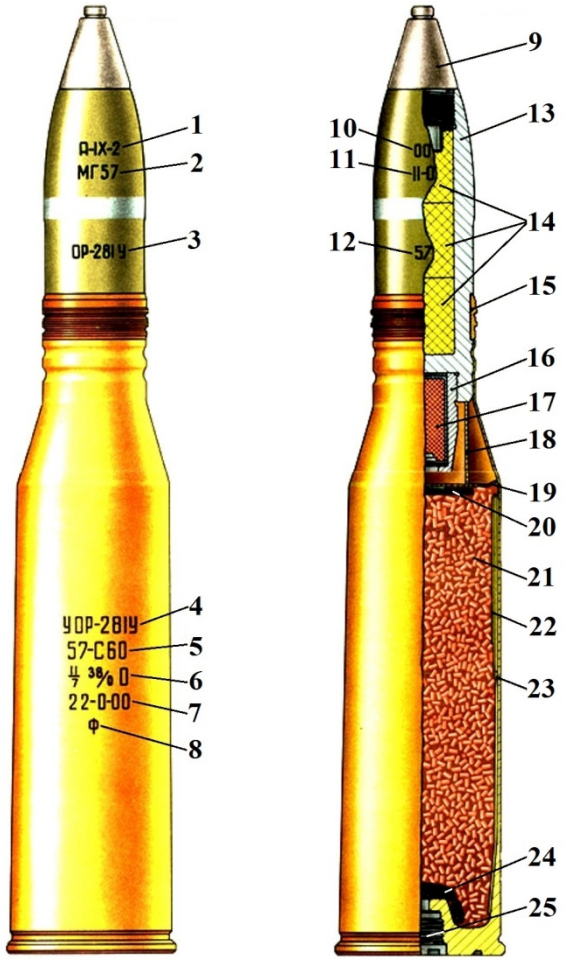
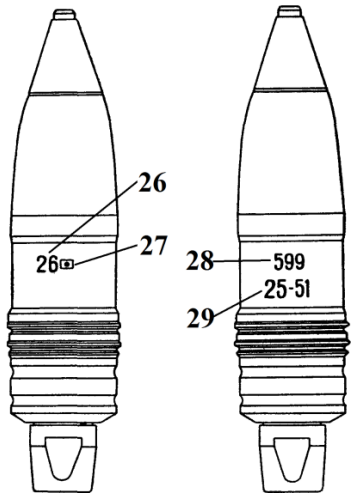
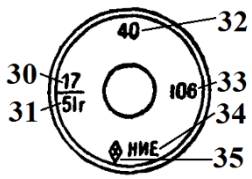
Type	Characteristic
МГ-57, МГЗ-57	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shell. Mechanical fuze, with delayed action. The fuze is armed at distance not less than 20 m from muzzle. The fuze has a self-destruction mechanism.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Rounds УОР-281 (without letter У) have the same projectile, but have a thinner case mouth and shallower crimping grooves. The УОР -281 projectile may only be crimped to the top swage groove to the cartridge case.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
CARTRIDGE		
		*1 - Type of explosive;* *2 - Type of fuze;* *3 - Type of projectile - "ОР-281У"* *4 - Marking of cartridge;* *5 - Marking of weapon;* *6 - Marking of powder (type, shape) and series, year of manufacture of powder and code manufacturer;* *7 - Series-year of production and symbol of filling factory;* *8 - Marking of flash reducing agent;* *9 - Fuze;* *10 - Marking of manufacturer;* *11 - Series and year of manufacture of projectile;* *12 - Calibre;* *13 - Body;* *14 - Explosive charges;* *15 - Driving bands;* *16 - Case of tracer;* *17 - Tracer;* *18 - Tube expansion - spacer;* *19 - Cover;* *20 - Decoppering agent;* *21 - Propellant charge;* *22 - Flash reducing agent;* *23 - Cartridge case;* *24 - Igniter;* *25 - Primer;* *26 - Number of melt;* *27 - Sign for testing the hardness - Brinell;* *28 - Marking of manufacturer of body;* *29 - Series and year of production of projectile body;* *30, 31 - Series and year of manufacture of cartridge;* *32 - Number of melt;* *33 - Marking of manufacturer;* *34, 35 - Symbols of control and inspection*
PROJECTILE (stamped marks)	**BOTTOM of the cartridge case**	
		

	FWP Ammunition	ANNEX C-12

FIELD of AMMUNITION	*artillery*
CALIBER	*57 mm*
NAME	*57 mm Fixed Cartridge High Explosive - Fragmentation with Tracer*
TYPE	*HE-FRAG-T*
NAME/ASSIGNED MARK (original)	*57-JOSv-PLK S-60*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 57 mm anti- aircraft gun M S-60 (57PLK S-60)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*57-JOSv-PLK S-60*	**abbreviation**	*OSv-57*	**abbreviation**	*Nk 57 PLK S-60*
length [*mm*]	*530-535*	**weight [*kg*]**	*2.850*	**type and size of propellant charge**	*Nc7p 8.9x1.7/14-(11/7)*
average weight [*kg*]	*6.35*	**length [*mm*]**	*218-220*		
initial velocity of projectile [$m.s^{-1}$]	*960*	**type of explosive**	*A-IX-2*	**weight of propellant charge [*kg*]**	*1.130*
maximum range (of fire) [*m*]	*horizontal 12000 vertical 8400*	**weight of explosive [*kg*]**	*0.153*	**material of cartridge case**	*Ms*
		type of fuze	*MG-57, MG-57a*	**length [*mm*]**	*348*
				type of primer	*KV-5U*

PACKING

Number of rounds in the crate	*5*	**Weight of full crate [*kg*]**	*42*

DESCRIPTION

57-JOSv-PLK S-60 is used to engage light armoured easy targets, tanks, armoured vehicles and aircraft. This projectile consists of a body (27), explosive charges (28), fuze (25) and tracer (30).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

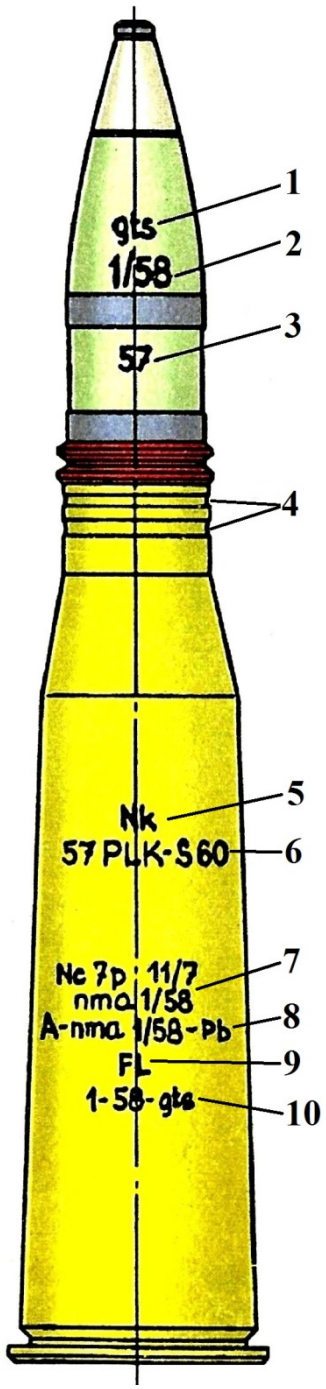
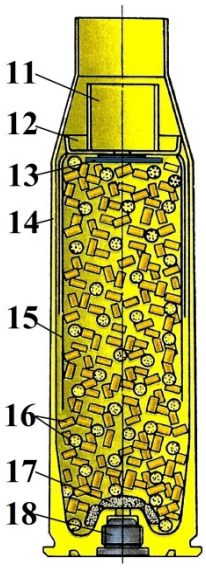
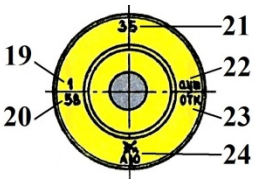
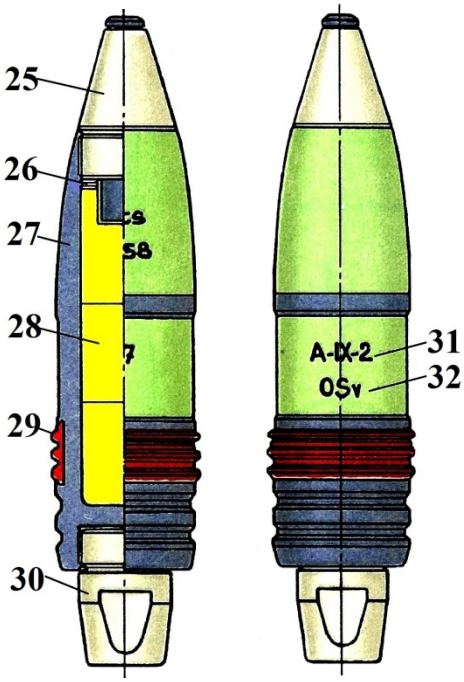
Type	Characteristic
MG-57, MG-57a	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band is made from copper. The cartridge case is made from brass.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
	 **BOTTOM of the cartridge case**  	*1 - Symbol of filling factory of projectile;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Crimps;* *5 - Marking of cartridge case assembly;* *6 - Marking of weapon;* *7 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder;* *8 - Type of black powder in igniter, symbol of manufacturer, series/year of production and type of decoppering agent;* *9 - Marking of flash reducing agent;* *10 - Series/year of production and symbol of filling factory;* *11 - Tube expansion - spacer;* *12 - Cover;* *13 - Decoppering agent;* *14 - Cartridge case;* *15 - Flash reducing agent;* *16 - Propellant;* *17 - Igniter;* *18 -Primer;* *19, 20 - Series, year of manufacture of cartridge case;* *21 - Number of melt;* *22 - Symbol of manufacturer;* *23 - Symbol of control;* *24 - Symbol of inspection;* *25 - Fuze;* *26 - Cardboard pads;* *27 - Body of projectile;* *28 - Explosive charges;* *29 - Driving bands;* *30 - Tracer* *31 - Type of explosives;* *32 - Type of projectile - “OSv”.*

	FWP Ammunition	**ANNEX C-13**

FIELD of AMMUNITION	*artillery; anti-aircraft artillery*
CALIBER	*57 mm*
NAME	*57 mm Fixed Cartridge Armour Piercing with Tracer*
TYPE	*AP-T*
NAME/ASSIGNED MARK (original)	*УБР-281 and УБР-281У*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *57 mm anti-aircraft gun M S-60 (57 PLK S-60)*

CARTRIDGE		**PROJECTILE**		**CARTRIDGE CASE ASSEMBLY**	
abbreviation	*УБР-281* *УБР-281У*	**abbreviation**	*БР-281* *БР-281У*	**abbreviation**	*УБР-281* *57-С-60*
average weight [*kg*]	*6.61*	**weight [*kg*]**	*2.80*	**type and size of propellant charge**	*11/7 СВ* *or* *9/7МГЖ+12/1Тр*
		length [*mm*]	*210*		
length [*mm*]	*529 - 537*	**type of explosives**	*A-IX-2*		
initial velocity of projectile [$m.s^{-1}$]	*960*	**weight of blasting filler [*kg*]**	*0.013*	**weight of propellant charge [*kg*]**	*1.2*
effective range (of fire) [*m*]	*2000*	**type of fuze**	*МД-10*	**material of cartridge case**	*Ms (brass)*
				length [*mm*]	*348*
				type of primer	*КВ-5У*

PACKING

Number of rounds in the crate	*5*	**Weight of full crate [*kg*]**	*49*

DESCRIPTION

УБР-281 or УБР-281У are used to engage light armoured targets, tanks, armoured vehicles and aircraft. This projectile consists of a windshield (9), Makarov's cap (10), body (11), explosive charge (12), Driving bands (13) and fuze with tracer (14).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

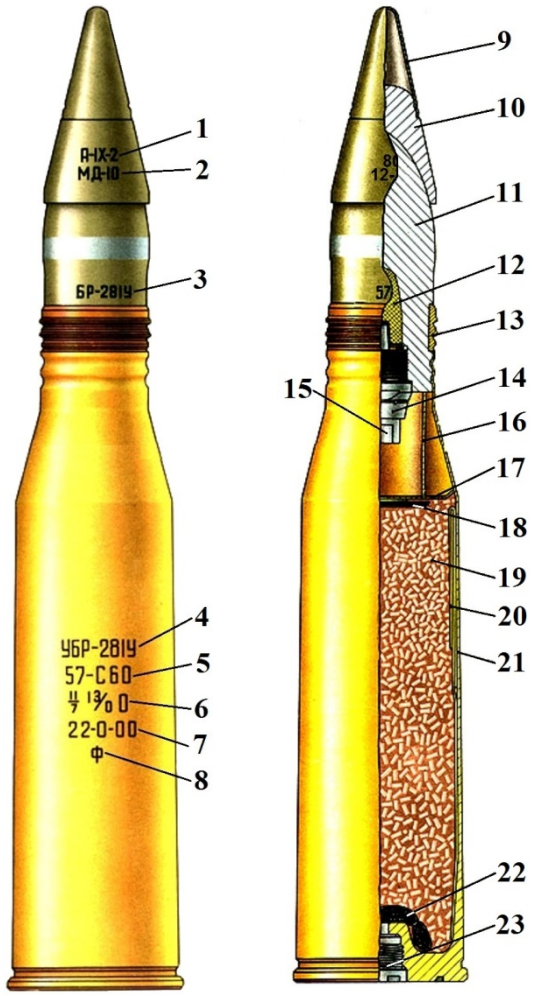
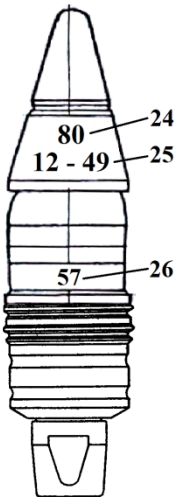
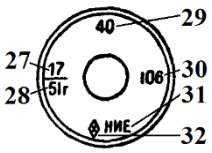
Type	**Characteristic**
МД-10	*Fuze is inserted into the bottom of shot and is armed by the inertial forces in the flight of the shot to the target.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Round УБР-281 (without letter У) have the same shell, but have a thinner case mouth and shallower crimping grooves. The УБР -281 projectile may only have one crimp on to the cartridge case.

DRAWINGS/CUTAWAY/MARKING/STENCILING:	LEGEND
	*1 - Type of explosive;* *2 - Type of fuze;* *Marking of manufacturer;* *3 - Type of projectile - "БР-281У"* *Series and year of manufacture of projectile;* *4 - Marking of cartridge;* *5 – Calibre-Marking of weapon;* *6 - Marking of powder (type, shape) and series, year of manufacture of powder and code manufacturer;* *7 - Series-year of production and symbol of filling factory;* *8 - Marking of flash reducing agent;* *9 - Windshield;* *10 - Makarov's cap;* *11 - Body of projectile;* *12 - Explosive charge;* *13 - Driving bands;* *14 - Fuze;* *15 - Tracer;* *16 - Tube expansion - spacer;* *17 - Cover;* *18 - Decoppering agent;* *19 - Propellant charge;* *20 - Flash reducing agent;* *21 - Cartridge case;* *22 - Igniter;* *23 - Primer;* *24 - Marking of manufacturer of projectile;* *25 - Series and year of production of projectile;* *26 - Calibre;* *27, 28 - Series and year of manufacture of cartridge;* *29 - Number of melt;* *30 - Symbol of manufacturer;* *31, 32 - Symbols of control and inspection* *<u>Body projectile have the tamped marks</u>:* *- Number of melt;* *- Sign for testing the hardness - Brinell;* *- Marking of manufacturer of body;* *- Series and year of production of body.*
PROJECTILE (back side)	**BOTTOM of the cartridge case**
	

	FWP Ammunition	**ANNEX C-14**

FIELD of AMMUNITION	*artillery*
CALIBER	*57 mm*
NAME	*57 mm Fixed Cartridge High Explosive - Fragmentation with Tracer Practice*
TYPE	*HE-FRAG-T Practice*
NAME/ASSIGNED MARK (original)	*57-JONhSv-PLK S-60*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 57 mm anti- aircraft gun M S-60 (57PLK S-60)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*57-JONhSv-PLK S-60*	**abbreviation**	*S 60*	**abbreviation**	*Nk 57 PLK S-60*
length [*mm*]	*530-535*	**weight [*kg*]**	*2.850*	**type and size of propellant charge**	*Nc7p 8.9x1.7/14-(11/7)*
average weight [*kg*]	*6.35*	**length [*mm*]**	*218-220*		
initial velocity of projectile [$m.s^{-1}$]	*960*	**type of explosive**	---	**weight of propellant charge [*kg*]**	*1.130*
maximum range (of fire) [*m*]	*horizontal 12000 vertical 8400*	**weight of explosive [*kg*]**	---		
		type of fuze	*MG-57Nh*	**material of cartridge case**	*Ms*
				length [*mm*]	*348*
				type of primer	*KV-5U*

PACKING			
Number of rounds in the crate	*5*	**Weight of full crate [*kg*]**	*42*

DESCRIPTION

57-JONhSv-PLK S-60 is used for training and testing the engagement of light armoured targets, tanks, armoured vehicles and aircraft. This projectile consists of a body (28), inert material (29), fuze-dummy (25) and tracer (31).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

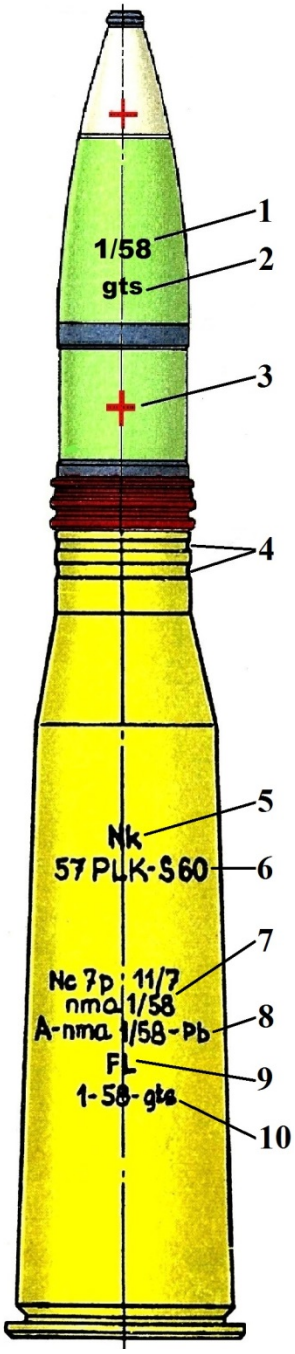
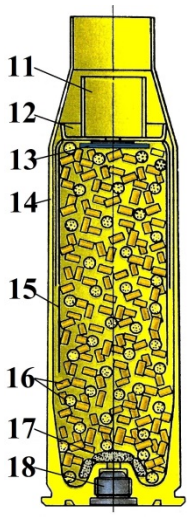
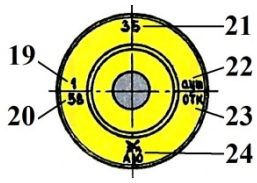
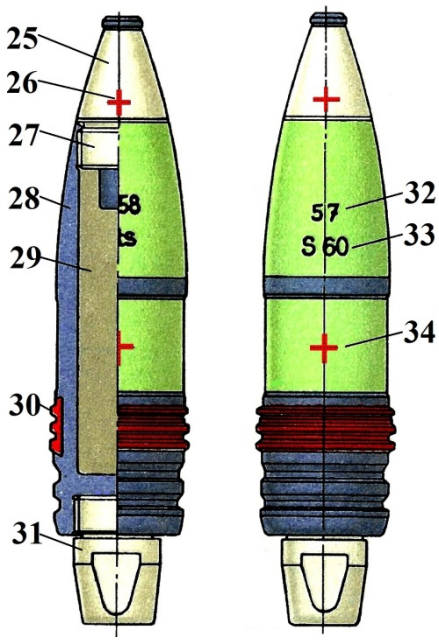
Type	Characteristic
MG-57Nh - dummy	*Fuze without explosive.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Driving band is made from copper. The cartridge case is made from brass.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
		**BOTTOM of the cartridge case** 	*1 - Series and year of production of projectile;* *2 - Symbol of filling factory; 3 - Red cross = type of practice projectile "ONhSv";* *4 - Crimps;* *5 - Marking of cartridge case assembly;* *6 - Marking of weapon;* *7 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder;* *8 - Type of black powder in igniter, symbol of manufacturer, series/year of production and type of decoppering agent;* *9 - Marking of flash reducing agent;* *10 - Series/year of production and symbol of filling factory;* *11 - Tube expansion - spacer;* *12 - Cover;* *13 - Decoppering agent;* *14 - Cartridge case;* *15 - Flash reducing agent;* *16 - Propellant;* *17 - Igniter;* *18 -Primer;* *19, 20 - Series, year of manufacture of cartridge case;* *21 - Number of melt;* *22 - Symbol of manufacturer;* *23 - Symbol of control;* *24 - Symbol of inspection;* *25 - Fuze - dummy;* *26 - Red cross = marking of fuze dummy;* *27 - Fuze - dummy;* *28 - Body of projectile;* *29 - Inert material;* *30 - Driving bands;* *31 - Tracer;* *32 - Calibre;* *33 - Marking of weapon;* *34 - Red cross = type of pract. projectile "ONhSv".*
			

FWP Ammunition

ANNEX C-15

FIELD of AMMUNITION	*artillery*
CALIBER	*57 mm*
NAME	*57 mm Fixed Cartridge High Explosive - Fragmentation with Tracer*
TYPE	*HE-FRAG-T*
NAME/ASSIGNED MARK (original)	*57-JOSv-PLK čs (old)*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 57 mm anti- aircraft gun M čs (57PLKčs)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*57-JOSv-PLK čs*	**abbreviation**	*OSv-57*	**abbreviation**	*Nk 57 PLK čs*
length [*mm*]	*633-637*	**weight [*kg*]**	*2.56*	**type and size of propellant charge**	*Dgtp 3.3x1.15/285-7.5*
average weight [*kg*]	*6.35*	**length [*mm*]**	*285-290*		
initial velocity of projectile [$m.s^{-1}$]	*985*	**type of explosive**	*TNT*	**weight of propellant charge [*kg*]**	*2.41*
maximum range (of fire) [*m*]	*horizontal 14500 vertical 10200*	**weight of explosive [*kg*]**	*0.284*		
		type of fuze	*nz 20*	**material of cartridge case**	*Ms*
				length [*mm*]	*398*
				type of primer	*E-55*

PACKING

Number of rounds in the crate	*5*	**Weight of full crate [*kg*]**	*42*

DESCRIPTION

57-JOSv-PLK čs is used to engage light armoured targets, tanks, armoured vehicles and aircraft. This projectile consists of a body (31), explosive charges (33), fuze (30) and tracer „Sv-10“ (35).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

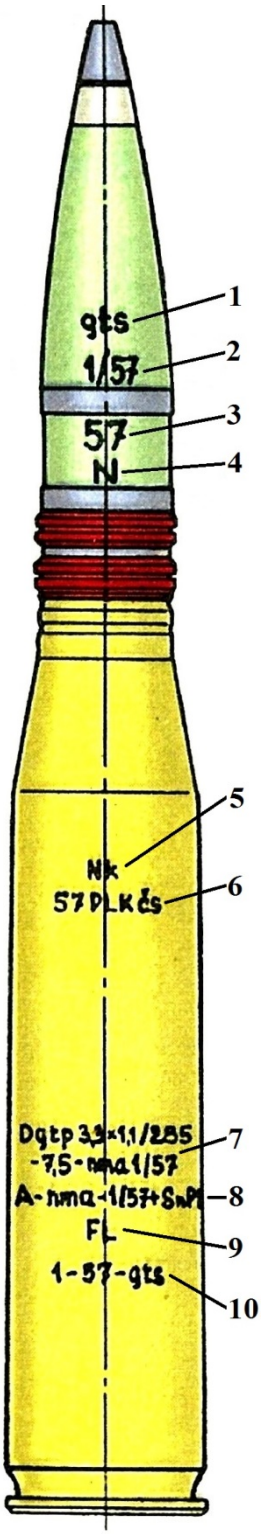
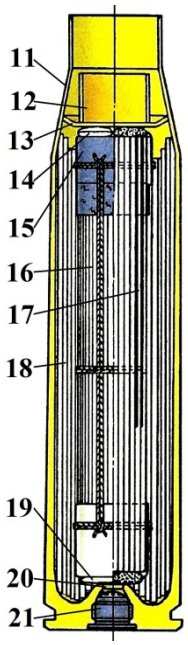
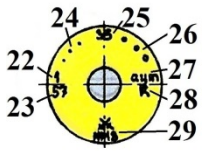
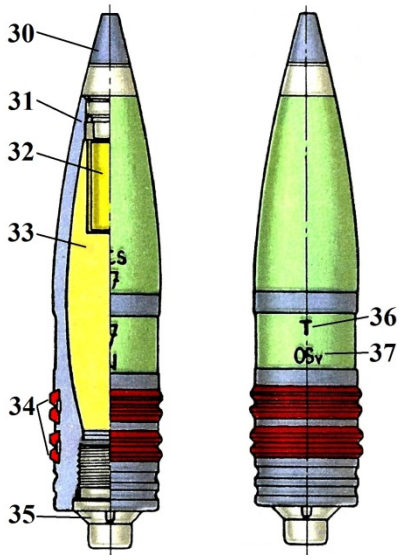
Type	Characteristic
nz 20	*It is screwed into the nose of the shell and armed by the inertial forces actin on the shell.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Produced until 1957; filled by cast TNT. Driving band is made from copper. The cartridge case is made from brass.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
		**BOTTOM of the cartridge case** 	*1 - Symbol of filling factory of projectile;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Marking of cartridge case assembly;* *6 - Marking of weapon;* *7 - Marking of powder (type, shape, dimension) and manufacturer, series, year of manufacture of powder;* *8 - Type of black powder in igniter, symbol of manufacturer, series, year of production and type of decoppering agent;* *9 - Marking of flash reducing agent;* *10 - Series/year of production and symbol of filling factory;* *11 - Cartridge case;* *12 - Tube expansion - spacer;* *13 - Cover;* *14 - Upper igniter;* *15 - Decoppering agent;* *16 - Propellant - bunch;* *17 - Flash reducing agent;* *18 - Propellant - free;* *19 - Bottom igniter;* *20 - Label with propellant data;* *21 - Primer;* *22, 23 - Series, year of manufacture of cartridge;* *24 - Number of calibration;* *25 - Number of melt;* *26 - Number of shots;* *27 - Symbol of manufacturer;* *28 - Symbol of control;* *29 - Symbol of inspection;* *30 - Fuze;* *31 - Body of projectile;* *32 - Booster charge;* *33 - Bursting charge;* *34 - Driving bands;* *35 - Tracer;* *36 - Type of explosive;* *37 - Type of projectile - “OSv”.*
			

	FWP Ammunition	**ANNEX C-16**

FIELD of AMMUNITION	*artillery*
CALIBER	*57 mm*
NAME	*57 mm Fixed Cartridge High Explosive - Fragmentation with Tracer*
TYPE	*HE-FRAG-T*
NAME/ASSIGNED MARK (original)	*57-JOSv-PLK čs (new)*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 57 mm anti- aircraft gun M čs (57PLKčs)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*57-JOSv-PLK čs*	**abbreviation**	*OSv-57*	**abbreviation**	*Nk 57 PLK čs*
length [*mm*]	*633-637*	**weight [*kg*]**	*2.56*	**type and size of propellant charge**	*Dgtp 3.3x1.15/285-7.5*
average weight [*kg*]	*6.35*	**length [*mm*]**	*285-289*		
initial velocity of projectile [$m.s^{-1}$]	*985*	**type of explosive**	*TNT*	**weight of propellant charge [*kg*]**	*2.41*
maximum range (of fire) [*m*]	*horizontal 14500 vertical 10200*	**weight of explosive [*kg*]**	*0.268*	**material of cartridge case**	*Ms*
		type of fuze	*nz 21*	**length [*mm*]**	*398*
				type of primer	*E-55*

PACKING

Number of rounds in the crate	*5*	**Weight of full crate [*kg*]**	*42*

DESCRIPTION

57-JOSv-PLK čs is used to engage light armoured targets, tank, armoured vehicles and aircraft. This projectile consists of a body (31), explosive charge (33), fuze (30) and tracer „No 8“(35).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

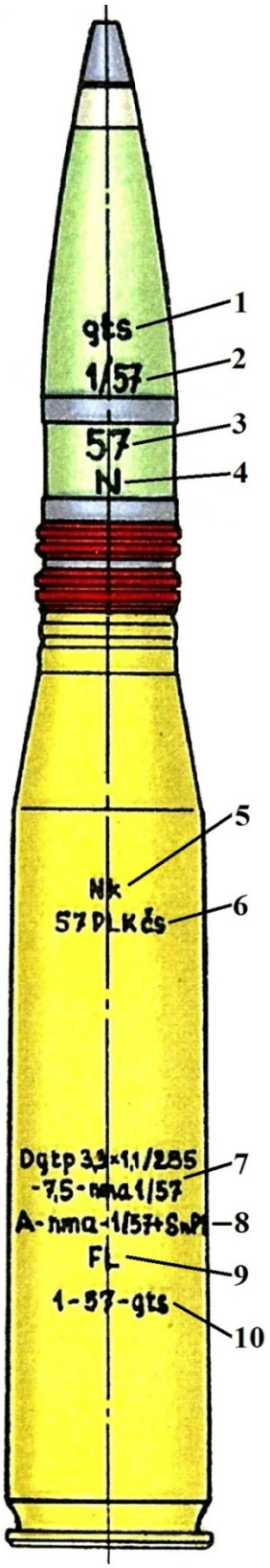
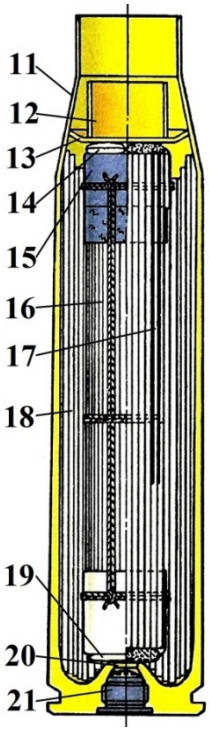
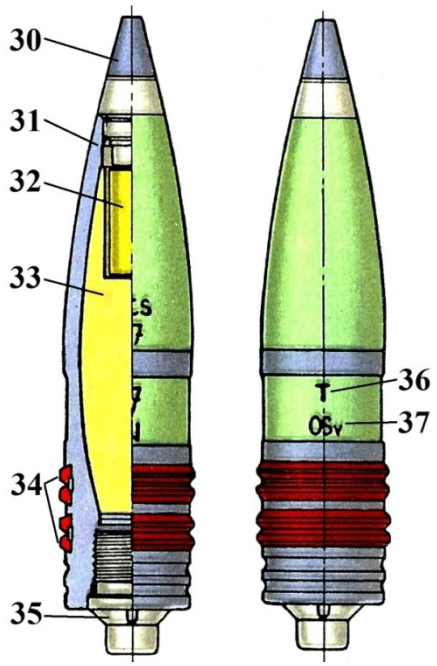
Type	Characteristic
nz 21	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Produced until 1958; filled with molded TNT. Driving band is made from copper. The cartridge case is made from brass.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
		**BOTTOM of the cartridge case**	*1 - Symbol of filling factory of projectile;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Marking of cartridge case assembly;* *6 - Marking of weapon;* *7 - Marking of powder (type, shape, dimension) and manufacturer, series, year of manufacture of powder;* *8 - Type of black powder in igniter, symbol of manufacturer, series, year of production and type of decoppering agent;* *9 - Marking of flash reducing agent;* *10 - Series/year of production and symbol of filling factory;* *11 - Cartridge case;* *12 - Tube expansion - spacer;* *13 - Cover;* *14 - Upper igniter;* *15 - Decoppering agent;* *16 - Propellant - bunch;* *17 - Flash reducing agent;* *18 - Propellant - free;* *19 - Bottom igniter;* *20 - Label with propellant data;* *21 - Primer;* *22, 23 - Series, year of manufacture of cartridge;* *24 - Number of calibration;* *25 - Number of melt;* *26 - Number of shots;* *27 - Symbol of manufacturer;* *28 - Symbol of control;* *29 - Symbol of inspection;* *30 - Fuze;* *31 - Body of projectile;* *32 - Booster charge;* *33 - Bursting charge;* *34 - Driving bands;* *35 - Tracer;* *36 - Type of explosive;* *37 - Type of projectile - "OSv".*
			

	FWP Ammunition	**ANNEX C-17**

FIELD of AMMUNITION	*artillery*
CALIBER	*57 mm*
NAME	*57 mm Fixed Cartridge High Explosive - Fragmentation with Tracer Practice*
TYPE	*HE-FRAG-T Practice*
NAME/ASSIGNED MARK (original)	*57-JONhSv-PLK čs*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 57 mm anti- aircraft gun M čs (57PLKčs)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*57-JOSv-PLK čs*	**abbreviation**	*ONhSv-57*	**abbreviation**	*Nk 57 PLK čs*
length [*mm*]	*633-637*	**weight [*kg*]**	*2.56*	**type and size of propellant charge**	*Dgtp 3.3x1.15/285-7.5*
average weight [*kg*]	*6.35*	**length [*mm*]**	*285-289*		
initial velocity of projectile [$m.s^{-1}$]	*985*	**type of explosive**	---	**weight of propellant charge [*kg*]**	*2.41*
maximum range (of fire) [*m*]	*horizontal 14500 vertical 10200*	**weight of explosive [*kg*]**	---	**material of cartridge case**	*Ms*
		type of fuze	*nz 21 dummy*	**length [*mm*]**	*398*
				type of primer	*E-55*

PACKING			
Number of rounds in the crate	*5*	**Weight of full crate [*kg*]**	*42*

DESCRIPTION

57-JONhSv-PLK čs is used to engage light armoured targets, tank, armoured vehicle and aircraft. This projectile consists of a body (31), inert material (32), fuze dummy (30) and tracer „No 8“ (34).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

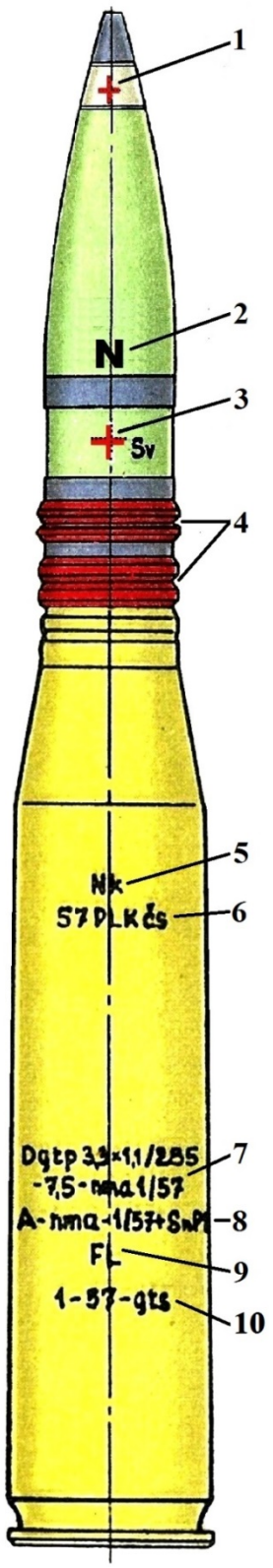
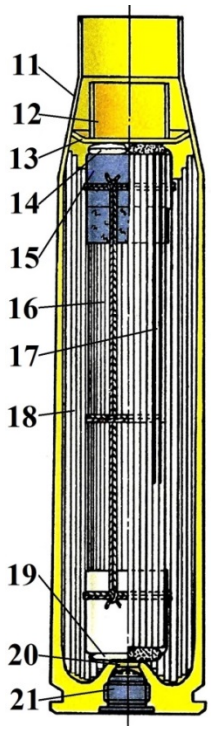
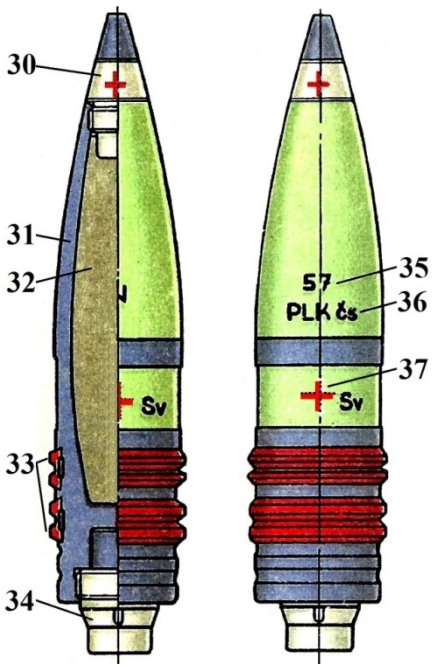
FUZE	
Type	**Characteristic**
nz 21 dummy	*Fuze without explosive.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Driving band is made from copper. The cartridge case is made from brass.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
		**BOTTOM of the cartridge case** 	*1 - Fuze - dummy;* *2 - Weight sign;* *3 - Type of shot = "ONhSv"* *4 - Driving bands;* *5 - Marking of cartridge;* *6 - Marking of weapon;* *7 - Marking of powder (type, shape, dimension) and manufacturer, series, year of manufacture of powder;* *8 - Type of black powder in igniter, symbol of manufacturer, series, year of production and type of decoppering agent;* *9 - Marking of flash reducing agent;* *10 - Series/year of production and symbol of filling factory;* *11 - Cartridge case;* *12 - Tube expansion - spacer;* *13 - Cover;* *14 - Upper igniter;* *15 - Decoppering agent;* *16 - Propellant - bunch;* *17 - Flash reducing agent;* *18 - Propellant - free;* *19 - Bottom igniter;* *20 - Label with propellant data;* *21 - Primer;* *22, 23 - Series, year of manufacture of cartridge case;* *24 - Number of calibration;* *25 - Number of melt;* *26 - Number of shots;* *27 - Symbol of manufacturer;* *28 - Symbol of control;* *29 - Symbol of inspection;* *30 - Type of fuze - red cross = dummy;* *31 - Body of projectile;* *32 - Inert material;* *33 - Driving bands;* *34 - Tracer;* *35 - Calibre;* *36 - Marking of weapon;* *37 - Type of projectile - red cross = Practice.*		

FWP Ammunition

ANNEX C-18

FIELD of AMMUNITION	*infantry*
CALIBER	*73 mm*
NAME	*73 mm Separate Cartridge High Explosive Anti-Tank with Tracers*
TYPE	*HEAT-T*
NAME/ASSIGNED MARK (original)	*PG-15V*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 73 mm gun 2A28 - БМП-1 and БМД-1 (73 mm K M1971)*

CARTRIDGE	
abbreviation	*73-PG-15V*
length [*mm*]	*866 - 877*
weight [*kg*]	*3.495*
initial velocity of projectile [$m.s^{-1}$]	*400 (next 665)*
maximum range (of fire) [*m*]	*1300*

PROJECTILE	
abbreviation	*PG-9*
length [*mm*]	*760*
weight [*kg*]	*2.615*
type of explosives	*A-IX-1*
weight of blasting filler [*kg*]	*0.322*
type of fuze	*VP-9*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*PG-15P*
type and size of propellant charge	*Ngpp 0.6/7.5/90-11.8 (NBL-60)*
weight of propellant charge [*kg*]	*0.160*
material of cartridge case	*Fe*
type of primer	*EKV—23A*

PACKING

Number of rounds in the crate	*6*	**Weight of full crate [*kg*]**	*51*

DESCRIPTION

73-PG-15V is used for engaging tanks, armoured vehicles, and self-propelled guns and against buildings and shelters. This projectile consists of fuze - head (1) and bottom (7) parts, hollow-charge projectile (2-6) with rocket engine (9-14) and tracers (16), cartridge case assembly (17).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
VP-9	*Fuze - double, impact, electrical, secure with masking safety and incorporating a self–destruct function.*

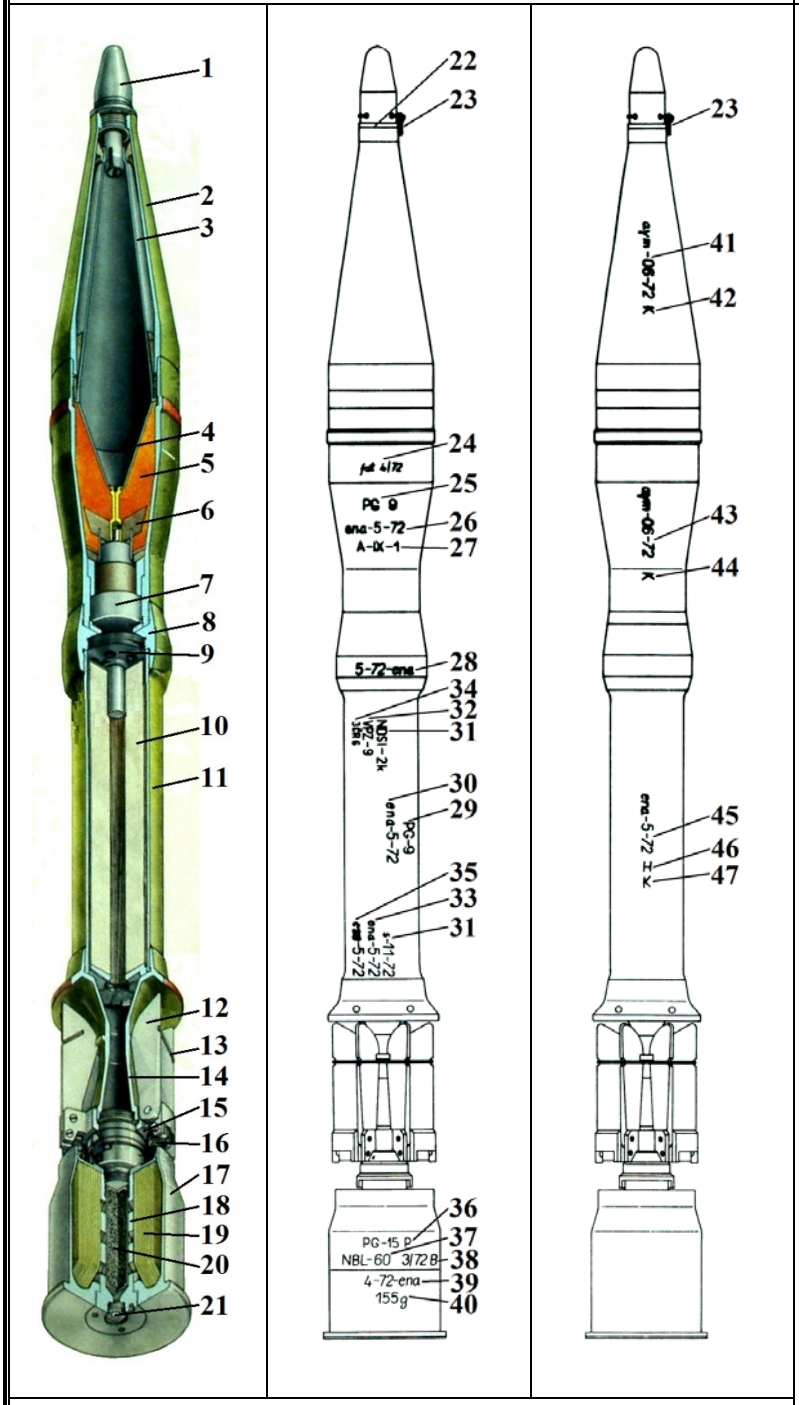
SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

The cartridge case is made of steel – with a zinc surface protection.

DRAWINGS/CUTAWAY/MARKING/STENCILING



PROJECTILE IN FLIGHT

LEGEND

1 - Fuze - head part; 2 - Ogive;
3 - Internal conical cap; 4 - Shaped charge liner (cumulative insert); 5 - Hollow charge;
6 - Insert; 7 - Fuze - bottom part;
8 - Mating ring; 9 - Pyrotechnic delay; 10 - Powder charge of rocket motor;
11 - Body of rocket motor;
12 - Fins; 13 - Shoe treads;
14 - Rocket jet; 15 - Coupling; 16 - Tracers;
17 - Cartridge case; 18 - Igniter;
19 - Propellant; 20 - Black powder in igniter;
21 - Electrical primer;
22 - Marking - stamped on the fuze:
VP-9H.Č. - type of fuze
ena - index of manufacturer
4-72 - series-year of production
23 - The textile label with inscription:
"BEFORE CHARGING RIP PIN AND REMOVE PROTECTIVE CAP";
24 -Index of manufacturer, series/year of production; 25 - Marking of projectile;
26 - Symbol of filling factory- series-year of production; 27 - Type of explosive;
28 - Series-year of completion - index of completing factory; 29 - Marking of projectile; 30 - Symbol of filling factory- series-year of production of rocket motor;
31 - Type of powder charge of rocket motor and symbol of factory- series-year of production of powder charge of rocket motor;
32 - Type of pyrotechnic timer;
33 - Symbol of factory- series-year of production of pyrotechnic timer;
34 - Type of tracers; 35 - Symbol of factory- series-year of production of tracers;
36 - Marking of cartridge case assembly;
37 - Type of propellant;
38 - Series-year and - index filling factory of powder; 39 - Series-year of production and symbol of filling factory;
40 - Weight of propellant;
41 - Index of manufacturer, series-year of production of head part projectile;
42 - Symbol of control;
43 - Index of manufacturer- series-year of production of head part projectile;
44 - Symbol of control;
45 - Symbol of filling factory- series-year of production of rocket engine;
46 - Symbol of the control;
47 - Symbol of control on the coercimeter.

	FWP Ammunition	**ANNEX C-19**

FIELD of AMMUNITION	*infantry*
CALIBER	*73 mm*
NAME	*73 mm Separate Cartridge High Explosive Fragmentation with Tracer*
TYPE	*HEAT-T*
NAME/ASSIGNED MARK (original)	*ОГ-15В*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *73 mm gun 2А28 - БМП-1 and БМД-1 (73 mm K M1971)*

CARTRIDGE		**PROJECTILE**		**CARTRIDGE CASE ASSEMBLY**	
abbreviation	*ОГ-15В*	**abbreviation**	*ОГ-9*	**abbreviation**	*ОГ-15П*
length [*mm*]	*829*	**length [*mm*]**	*727*	**type and size of propellant charge**	*NBL-60*
weight [*kg*]	*4.60*	**weight [*kg*]**	*3.70*		
initial velocity of projectile [$m.s^{-1}$]	*290*	**type of explosives**	*T*	**weight of propellant charge [*kg*]**	*0.160*
		weight of blasting filler [*kg*]	*0.735*	**material of cartridge case**	*Fe*
maximum range (of fire) [*m*]	*4400*	**type of fuze**	*ГО-2*	**type of primer**	*ЄКВ-23А*

PACKING			
Number of rounds in the crate	*6*	**Weight of full crate [*kg*]**	*58*

DESCRIPTION

ОГ-15В is designed for engaging enemy troops in the open, in trenches, in field shelters or in brick-wall fortifications. This cartridge consists of fuze (3), body (4), explosive charge (5), spacer tube (6), stabilizer (7), tracer (8) and cartridge case assembly (10).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

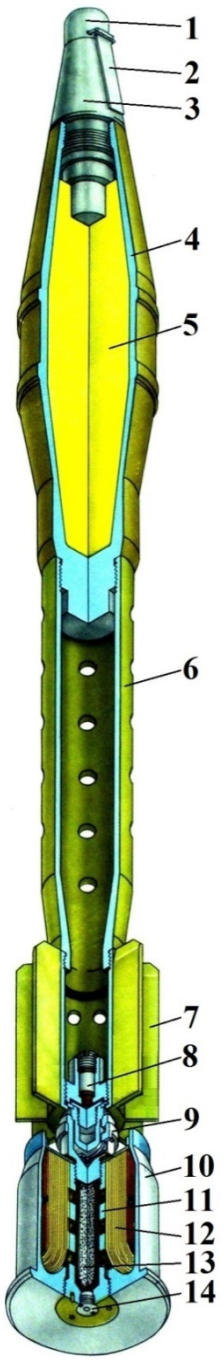
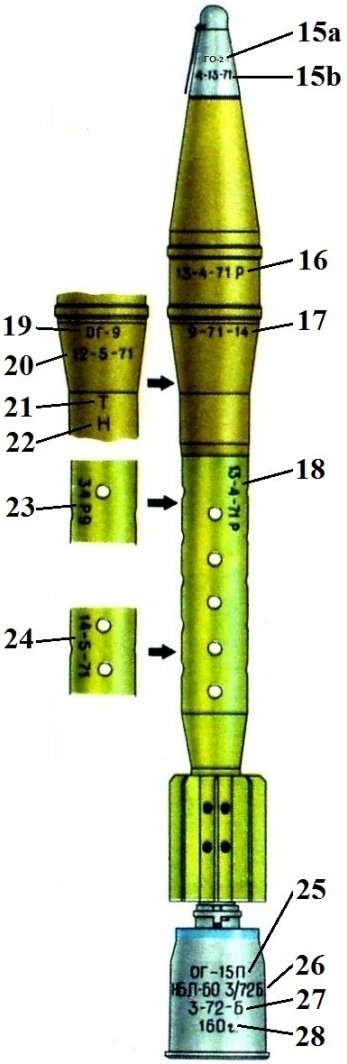
FUZE	
Type	**Characteristic**
ГО-2	*Fuze - impact, secure with masking safety and self-destruct function.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

The cartridge case is made of steel – with zinc surface protection. Spacer tube is unpainted.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
		*1 - Protective cap of fuze;* *2 - The textile label with inscription: "BEFORE CHARGING RIP PIN AND REMOVE PROTECTIVE CAP";* *3 - Fuze;* *4 - Body;* *5 - Explosive charge;* *6 - „Tail shaft“ - spacer tube;* *7 - Fins;* *8 - Tracer;* *9 - Coupling;* *10 - Cartridge case;* *11 - Igniter;* *12 - Propellant;* *13 - Black powder in igniter;* *14 - Electrical primer;* *15a - Type of fuze;* *15b - Series-year of completion fuze - index of completing factory;* *16 - Index of completing factory - series-year of completion head part and marking of control;* *17 - Series-year and index of completion fuze - index of mechanical factory;* *18 - Index of factory - series-year of production spacer tube and marking of control;* *19 - Type of projectile;* *20 - Index of manufacturer - series-year of production projectile;* *21 - Type of explosive;* *22 - Weight sign;* *23 - Marking of spacer tube;* *24 - Index of completing factory-series-year of production of spacer tube;* *25 - Marking of cartridge case assembly;* *26 - Type of propellant; Series-year and - index manufacturer of powder;* *27 - Series-year of production and symbol of filling factory;* *28 - Weight of propellant.*
PROJECTILE IN FLIGHT		

FWP Ammunition

ANNEX C-20

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm Fixed Cartridge High Explosive - Fragmentation*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*82-JOF-BzK 59*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *82 mm recoilless gun M 59 and M 59A* *(82 mm BzK M59 and M59A)*

CARTRIDGE	
abbreviation	*82-JOF-BzK 59*
length [*mm*]	*940 - 944*
weight [*kg*]	*14.40*
initial velocity of projectile [$m.s^{-1}$]	*565*
maximum range (of fire) [*m*]	*7560*

PROJECTILE	
abbreviation	*82-OF*
length [*mm*]	*469 - 472*
weight [*kg*]	*6.72*
type of explosives	*TNT*
weight of blasting filler [*kg*]	*0.435*
type of fuze	*nz 11*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*82-BzK 59*
type and size of propellant charge	*Dgtp 4.3x0.85/420-9.0*
weight of propellant charge [*kg*]	*2.80*
material of cartridge case	*Fe*
type of primer	*electrical primer*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*41*

DESCRIPTION

82-JOF-BzK 59 is used to engage light armoured targets, tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a fuze (1), body (3), explosive charge (4) and stabilizer (5) and fins (7).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

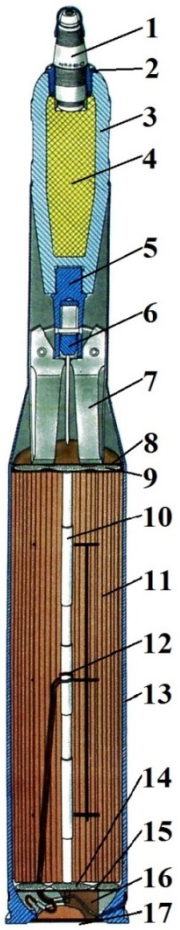
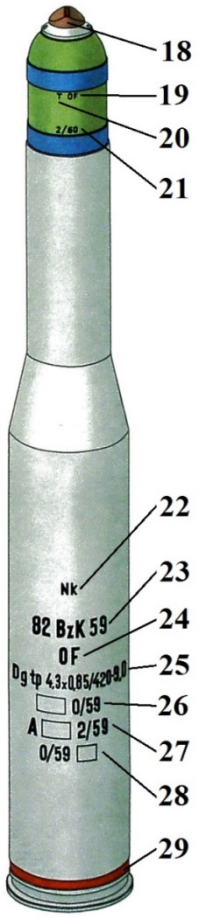
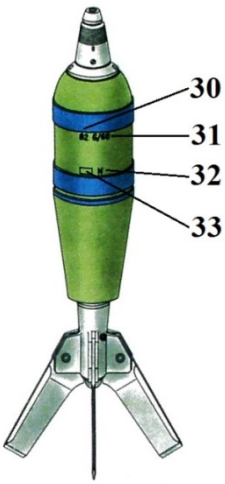
Type	Characteristic
nz 11	*Fuze - head, inertia fuze, super quick with detonator safety and mask safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

The cartridge case is made of steel – with zinc surface protection.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
		*1 - Fuze;* *2 – Mouth adapter;* *3 - Body;* *4 - Explosive charge;* *5 - Stabilizer;* *6 - Piston;* *7 - Fins;* *8 - Upper cover;* *9 - Upper igniter;* *10 - Ignition tube;* *11 - Propellant charge;* *12 - Wiring;* *13 - Cartridge case;* *14 - Bottom igniter;* *15 - Bottom cover;* *16 - Abutment;* *17 - Cover of textiles and rubber;* *18 - Plug;* *19 - Type of projectile;* *20 - Type of explosive;* *21 - Series/year manufacture of stabilizer;* *22 - Index of cartridge case assembly;* *23 - Calibre and type of gun;* *24 - Type of projectile;* *25 - Marking of powder (type, shape, dimension);* *26 - Index of manufacturer, series/year manufacture of propellant;* *27 - Marking in igniter, series/year manufacture in igniter;* *28 - Series/year and index of filling factory;* *29 - Contact strip;* *30 - Calibre;* *31 - Series/year of filling projectile;* *32 - Weight sign;* *33 - Index of filling factory.*
PROJECTILE IN FLIGHT		
		

	FWP Ammunition	**ANNEX C-21**

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm Fixed Cartridge High Explosive Anti-Tank*
TYPE	*HEAT*
NAME/ASSIGNED MARK (original)	*82-JPrSv-BzK 59*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *82 mm recoilless gun M 59 and M 59A* *(82 mm BzK M59 and M59A)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*82-JPrSv-BzK 59*	**abbreviation**	*82-PrSv*	**abbreviation**	*82-BzK 59*
length [*mm*]	*981 - 984*	**length [*mm*]**	*506 - 509*	**type and size of propellant charge**	*Dgtp 4.3x0.85/420-9.0*
weight [*kg*]	*13.20*	**weight [*kg*]**	*2.615*		
initial velocity of projectile [$m.s^{-1}$]	*745*	**type of explosives**	*T/H*	**weight of propellant charge [*kg*]**	*2.80*
maximum range (of fire) [*m*]	*4600*	**weight of blasting filler [*kg*]**	*0.40*	**material of cartridge case**	*Fe*
		type of fuze	*nz 41*	**type of primer**	*electrical primer*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*38*

DESCRIPTION

82-JPrSv-BzK 59 is used to engage tanks, armoured vehicles, self-propelled guns and against buildings and shelters. This projectile consists of a fuze (1), cap (2), body (4), cumulative insert (3), hollow charge (6), booster charge (7), stabilizer (8) with fins (10) and tracer (9).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

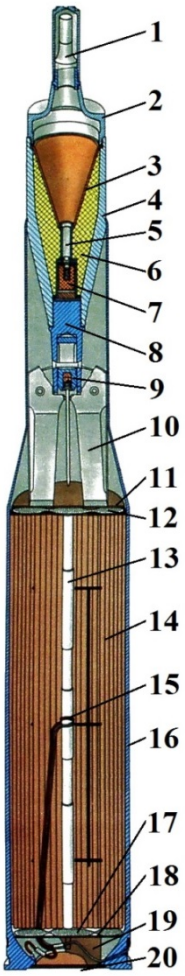
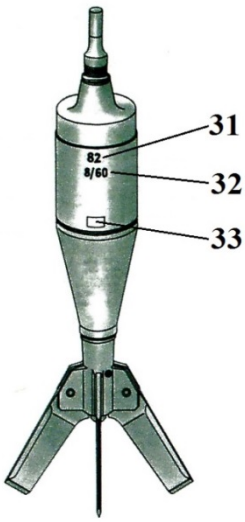
Type	Characteristic
nz 41	*Fuze - head, instantaneous, superquick with mask safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

The cartridge case is made of steel – with zinc surface protection

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
		*1 - Fuze;* *2 - Cap;* *3 - Shaped charge liner (cumulative insert);* *4 - Body;* *5 - Tube;* *6 - Hollow charge;* *7 - Booster charge;* *8 - Stabilizer;* *9 - Tracer in the piston;* *10 - Fins;* *11 - Upper cover;* *12 - Upper igniter;* *13 - Ignition tube;* *14 - Propellant charge;* *15 - Wiring;* *16 - Cartridge case;* *17 - Bottom igniter;* *18 - Bottom cover;* *19 - Abutment;* *20 - Cover of textiles and rubber;* *21 - Type of explosive;* *22 - Type of projectile;* *23 - Series/year manufacture of stabilizer and number of melt and index manufacturer of body;* *24 - Index of cartridge case assembly;* *25 - Calibre and type of gun;* *26 - Marking of powder (type, shape, dimension);* *27 - Index of manufacturer, series/year manufacture of propellant;* *28 - Marking in igniter, series/year manufacture in igniter;* *29 - Series/year and index of filling factory;* *30 - Contact strip;* *31 - Calibre;* *32 - Series/year of filling projectile;* *33 - Index of filling factory*
PROJECTILE IN FLIGHT		
		

	FWP Ammunition	**ANNEX C-22**

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm Fixed Cartridge High Explosive - Fragmentation - Practice*
TYPE	*HE-FRAG - Practice*
NAME/ASSIGNED MARK (original)	*82-JOFNh-BzK 59*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *82 mm recoilless gun M 59 and M 59A* *(82 mm BzK M59 and M59A)*

CARTRIDGE		**PROJECTILE**		**CARTRIDGE CASE ASSEMBLY**	
abbreviation	*82-JOFNh-BzK 59*	**abbreviation**	*82-OFNh*	**abbreviation**	*82-BzK 59*
length [*mm*]	*940 - 944*	**length [*mm*]**	*469 - 472*	**type and size of propellant charge**	*Dgtp 4.3x0.85/420-9.0*
weight [*kg*]	*14.40*	**weight [*kg*]**	*6.72*		
initial velocity of projectile [$m.s^{-1}$]	*565*	**type of explosives**	---	**weight of propellant charge [*kg*]**	*2.80*
		weight of blasting filler [*kg*]	---		
maximum range (of fire) [*m*]	*7560*	**type of fuze**	*nz 11 Nh - dummy*	**material of cartridge case**	*Fe*
				type of primer	*electrical primer*

PACKING			
Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*41*

DESCRIPTION

82-JOF-BzK 59 is used for training and testing the engagement of light armoured targets, tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a fuze (1), body (3), inert material (4) and stabilizer (5) with fins (7).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

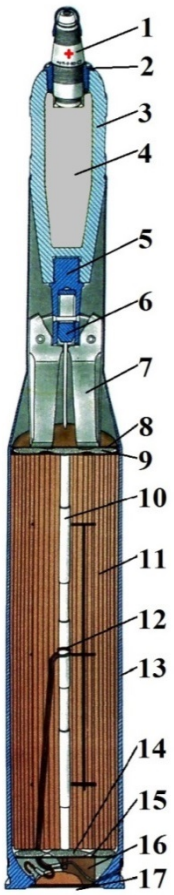
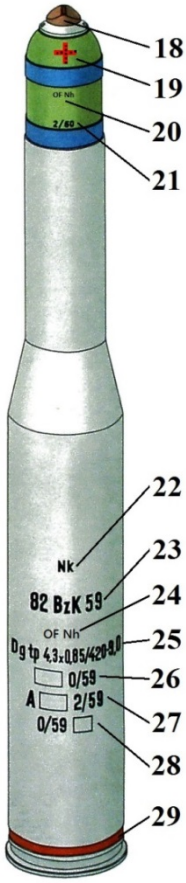
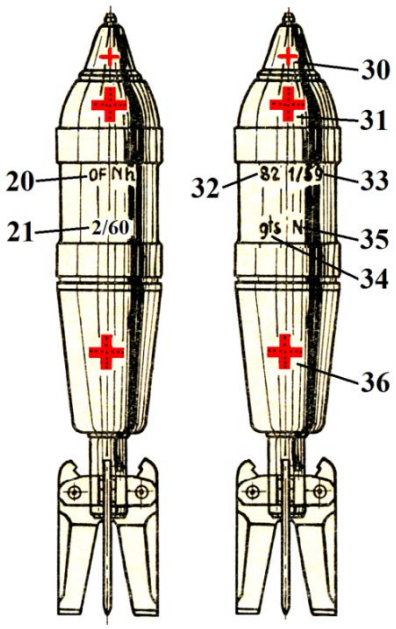
FUZE	
Type	**Characteristic**
nz 11 Nh - dummy	*Fuze without explosives.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

The cartridge case is made of steel – with zinc surface protection

DRAWINGS/CUTAWAY/MARKING/STENCILING:	LEGEND
 	*1 - Fuze and red cross - marking fuze type - dummy;* *2 - Fuze adapter;* *3 - Body;* *4 - Inert material;* *5 - Stabilizer;* *6 - Piston;* *7 - Fins;* *8 - Upper cover;* *9 - Upper igniter;* *10 - Ignition tube;* *11 - Propellant charge;* *12 - Wiring;* *13 - Cartridge case;* *14 - Bottom igniter;* *15 - Bottom cover;* *16 - Abutment;* *17 - Cover of textiles and rubber;* *18 - Plug;* *19 - Red cross - marking projectile type - practice;* *20 - Type projectile type „OFNh“;* *21 - Series/year manufacture of stabilizer;* *22 - Index of cartridge case assembly;* *23 - Calibre and type of gun;* *24 - Projectile type - Practice - „OFNh“;* *25 - Marking of powder (type, shape, dimension);* *26 - Index of manufacturer, series/year manufacture of propellant;* *27 - Marking in igniter, series/year manufacture in igniter;* *28 - Series/year and index of filling factory;* *29 - Contact strip;* *30 - Red cross - marking fuze type - dummy;* *31 - Red cross - marking projectile type - Practice;* *32 - Calibre;* *33 - Series/year of manufacture a projectile;* *34 - Index of filling factory;* *35 - Weight sign;* *36 - Red cross - marking projectile type – Practice.*
PROJECTILE	
	

FWP Ammunition

ANNEX C-23

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm Fixed Cartridge High Explosive Anti-Tank - Practice*
TYPE	*HEAT- Practice*
NAME/ASSIGNED MARK (original)	*82-JPrNhSv-BzK 59*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD *(the Slovak abbreviated designation)*	*Fired by 82 mm recoilless gun M 59 and M 59A (82 mm BzK M59 and M59A)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*82-JPrNhSv-BzK 59*	**abbreviation**	*82-PrNhSv*	**abbreviation**	*82-BzK 59*
length [*mm*]	*981 - 984*	**length [*mm*]**	*506 - 509*	**type and size of propellant charge**	*Dgtp 4.3x0.85/420-9.0*
weight [*kg*]	*13.20*	**weight [*kg*]**	*2.615*		
initial velocity of projectile [$m.s^{-1}$]	*745*	**type of explosives**	---	**weight of propellant charge [*kg*]**	*2.80*
		weight of blasting filler [*kg*]	---		
maximum range (of fire) [*m*]	*4600*	**type of fuze**	*nz 41 dummy*	**material of cartridge case**	*Fe*
				type of primer	*electrical primer*

PACKING			
Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*38*

DESCRIPTION

82-JPrNhSv-BzK 59 is used for training and testing the engagement of tanks, armoured vehicles, self-propelled guns and against buildings and shelters. This projectile consists of a fuze - dummy (1), cap (2), body (4), inert material (3), stabilizer (5) with fins (7) and tracer (6).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

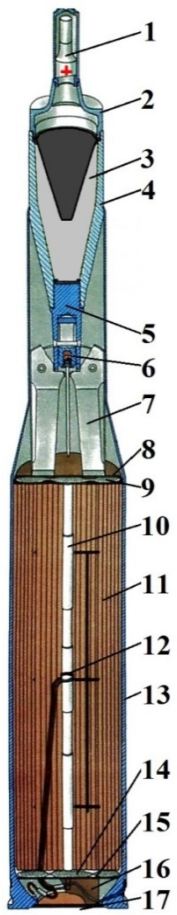
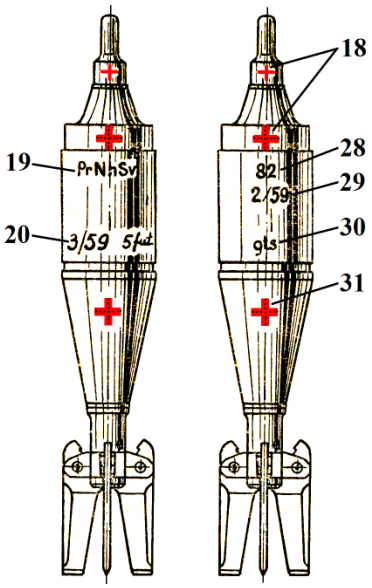
Type	Characteristic
nz 41 dummy	*Fuze without explosives.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

The cartridge case is made of steel – with zinc surface protection

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Fuze - dummy;* *2 - Cap;* *3 - Inert material;* *4 - Body;* *5 - Stabilizer;* *6 - Tracer in the piston;* *7 - Fins;* *8 - Upper cover;* *9 - Upper igniter;* *10 - Ignition tube;* *11 - Propellant charge;* *12 - Wiring;* *13 - Cartridge case;* *14 - Bottom igniter;* *15 - Bottom cover;* *16 - Abutment;* *17 - Cover of textiles and rubber;* *18 - Red cross - marking of type fuze - dummy or projectile – practice;* *19 - Marking practice projectile type;* *20 - Series/year manufacture of stabilizers and number of melt and index manufacturer of projectile body;* *21 - Index of cartridge case assembly;* *22 - Calibre and type of gun;* *23 - Marking of powder (type, shape, dimension);* *24 - Index of manufacturer, series/year manufacture of propellant;* *25 - Marking in igniter, series/year manufacture in igniter;* *26 - Series/year and index of filling factory;* *27 - Contact strip;* *28 - Calibre;* *29 - Series/year of filling projectile;* *30 - Index of filling factory;* *31 - Red cross - marking of projectile – Practice;*
PROJECTILE	
	

FWP Ammunition

ANNEX C-24

FIELD of AMMUNITION	*Artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge High Explosive - Fragmentation*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*85-JO-TK44, K52, PLK39*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K), 85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12), 85 mm cannon M1952 and M1952/1955 (85 K 52 and 85 K 52/55), 85 mm tank gun M1944 (85 TK 44), 85 mm fortress cannon M 1938/1944 and M1944/1959 (85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*85-JO-TK44, K52, PLK39*	**abbreviation**	*85-O*	**abbreviation**	*Nk 85TK44*
length [*mm*]	*940-949*	**weight [*kg*]**	*9.54*	**type and size of propellant charge**	*Dgtp 4.7x1.35/490-7.5 or Dgtp 5x1.5/490-7.5 or Nc7p 11.3x2/18-(14/7) +Nctp8x2.7/485-(18/1)*
average weight [*kg*]	*16.35*	**length [*mm*]**	*383-390*		
		type of explosives	*TNT*		
initial velocity of projectile [$m.s^{-1}$]	*785*	**weight of blasting filler [*kg*]**	*0.741*	**weight of propellant charge [*kg*]**	*Dg - 2.80 Nc - 2.60*
maximum range (of fire) [*m*]	*13800*	**type of fuze**	*KTM-1*	**weight of cartridge case [*kg*]**	*~3.80*
				length [*mm*]	*630*
				weight of decoppering agent [*kg*]	*0.020*
				type of primer	*KV-4, M1946M, M1949M*

PACKING

Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*68*

DESCRIPTION

85-JO is used to engage light armoured targets, tanks, armoured vehicles and aircraft. This projectile consists of a body (31), explosive charges (30)and fuze (29).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
KTM-1	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. It is used since 1952.*

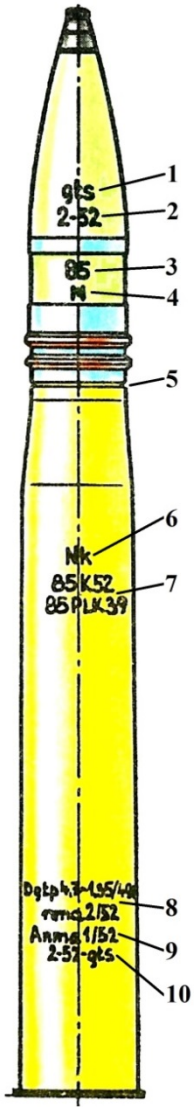
SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

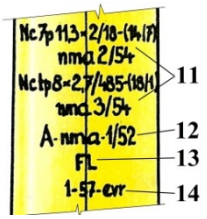
NOTICE

Driving band were made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. The cartridge case is made of brass or steel.

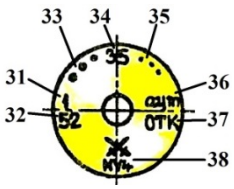
DRAWINGS/CUTAWAY/MARKING/STENCILING



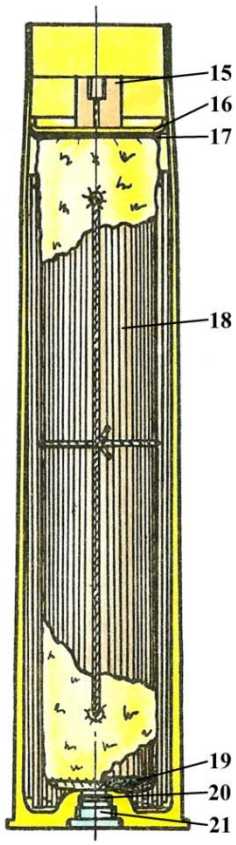
or



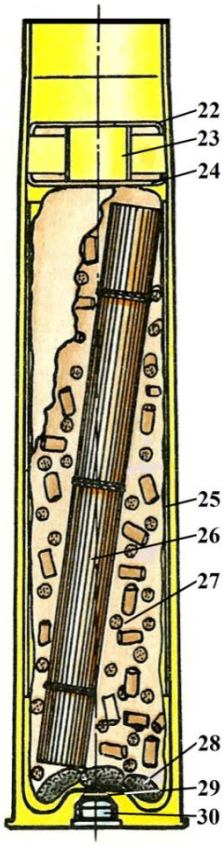
BOTTOM of the cartridge case

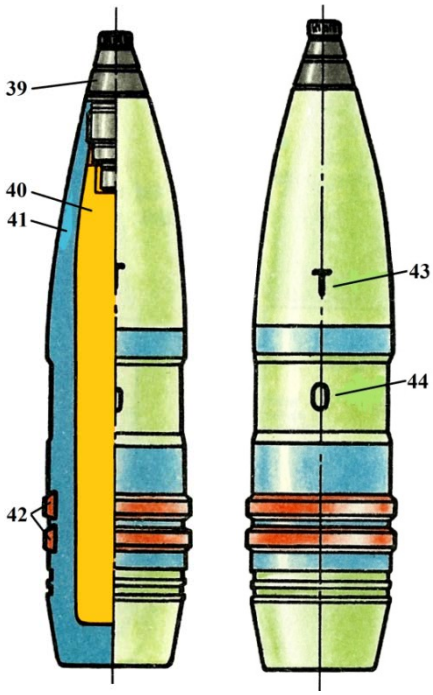


Propellant: „Dgtp“



„Nctp“ + „Nc7p“





LEGEND

1 - Symbol of filling factory;
2 - Series and year of production of projectile;
3 - Calibre;4 - Weight sign;
5 - Crimp;6 - Marking of cartridge case assembly;
7 - Marking of weapon;
8 - Marking of powder (type, shape, dimension) symbol of manufacturer, series/year of production;
9 - Type of black powder in igniter, symbol of manufacturer, series/year of production;
10 - Series-year of production and symbol of filling factory;
11 - Marking of powder (type, shape, dimension) symbol of manufacturer, series/year of production;
12 - Type of black powder in igniter, symbol of manufacturer, series/year of production;
13 - Marking of flash reducing agent;
14 - Series-year of production and symbol of filling factory;
15 - Tube (triangle) expansion - spacer;
16 - Cover;
17 - Decoppering agent;
18 - Propellant; 19 - Igniter;
20 - Paper label with the propellant data; 21 - Primer;
22 - Upper cover;
23 - Tube expansion - spacer;
24 - Lower cover; ,
25 - Flash reducing agent;
26 - Propellant “Nctp”;
27 - Propellant “Nc7p”;
28 - Igniter;
29 - Paper label with the propellant data;
30 - Primer;
31, 32 - Series, year of manufacture of cartridge;
33 - Number of calibration;
34 - Number of melt;
35 - Number of shots;
36 - Symbol of manufacturer;
37 - Symbol of control;
38 - Symbol of inspection;
39 - Fuze;
40 - Explosive charge;
41 - Body of projectile;
42 - Driving band
43 - Type of explosive;
44 - Type of projectile - “O”.

FWP Ammunition

ANNEX C-25

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge High Explosive - Fragmentation*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*85-JOF-TK44, K52, PLK39*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K), 85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12), 85 mm cannon M1952 and M1952/1955 (85 K 52 and 85 K 52/55), 85 mm tank gun M1944 (85 TK 44), 85 mm fortress cannon M 1938/1944 and M1944/1959 (85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*85-JOF-TK44, K52, PLK39*	**abbreviation**	*85-OF*	**abbreviation**	*Nk 85TK44*
length [*mm*]	*940-949*	**weight [*kg*]**	*9.54*	**type and size of propellant charge**	*Dgtp 4.7x1.35/490-7.5 or Dgtp 5x1.5/490-7.5*
average weight [*kg*]	*15.00*	**length [*mm*]**	*383-390*	**weight of propellant charge [*kg*]**	*2.80*
initial velocity of projectile [$m.s^{-1}$]	*785*	**type of explosives**	*TNT*	**length [*mm*]**	*630*
maximum range (of fire) [*m*]	*13800*	**weight of blasting filler [*kg*]**	*0.815*	**material of cartridge case**	*Ms (brass) Fe (steel)*
		type of fuze	*nz10, nz10a*	**weight of decoppering agent [*kg*]**	*0.020*
				type of primer	*KV-4, M1946M, M1949M*

PACKING

Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*68*

DESCRIPTION

85-JOF is used to engage light armoured targets, tanks, armoured vehicles, reinforced concrete objects and aircraft. This projectile consists of a body (31), explosive charges (30)and fuze (29).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

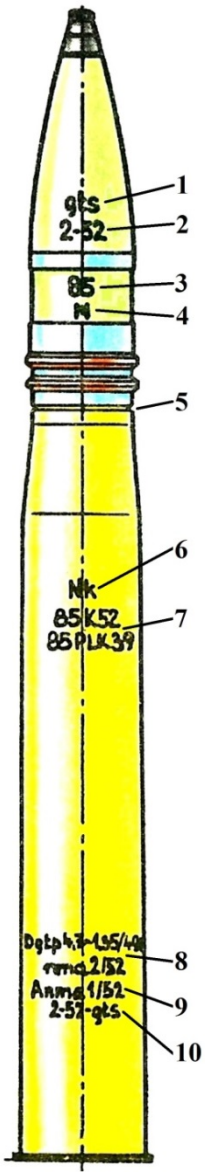
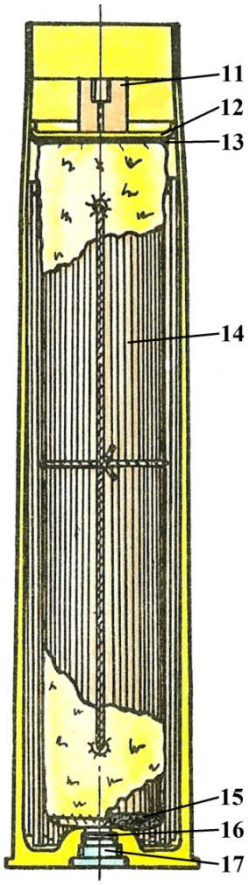
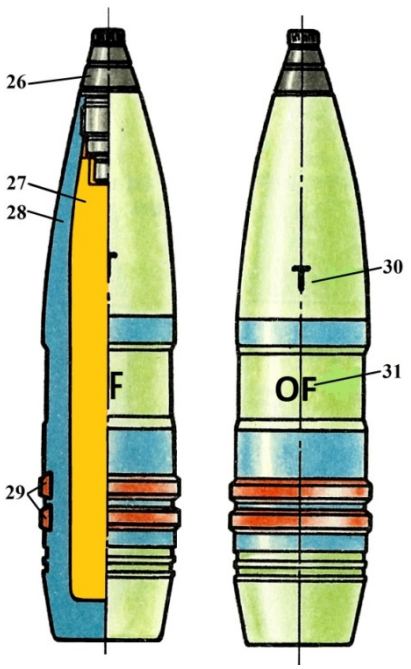
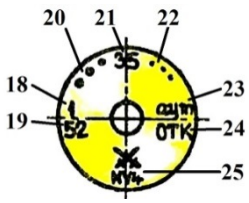
Type	Characteristic
nz 10, nz 10a	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. The fuze has an adjustable delay. The detonator is held to provide muzzle safety. It was used until 1952.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band is made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. The cartridge case is made of brass or steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
		*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre;4 - Weight sign;* *5 - Crimp;6 - Marking of cartridge case assembly;* *7 - Marking of weapon;* *8 - Marking of powder (type, shape, dimension) symbol of manufacturer, series/year of production;* *9 - Type of black powder in igniter, symbol of manufacturer, series/year of production and marking of decoppering agent "+SnPb";* *10 - Series-year of production and symbol of filling factory;* *11 - Tube (triangle) expansion - spacer;* *12 - Cover;* *13 - Decoppering agent;* *14 - Propellant; 15 - Igniter;* *15 - Paper label with the propellant data;* *16 -Primer;* *17 - Upper cover;* *18, 19 - Series, year of manufacture of cartridge;* *20 - Number of calibration;* *21 - Number of melt;* *22 - Number of shots;* *23 - Symbol of manufacturer;* *24 - Symbol of control;* *25 - Symbol of inspection;* *26 - Fuze;* *27 - Explosive charge;* *28 - Body of projectile;* *29 - Driving band* *30 - Type of explosive;* *31 - Type of shot - "OF".*
BOTTOM **of the cartridge case**		
		

	FWP Ammunition	**ANNEX C-26**

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Armour Piercing with Tracer*
TYPE	*AP-T*
NAME/ASSIGNED MARK (original)	*85-JPSv-TK44, K52, PLK39*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K),* *85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12),* *85 mm cannon M1952 and M1952/1955 (85 K 52 and 85 K 52/55), 85 mm tank gun M1944 (85 TK 44),* *85 mm fortress cannon M 1938/1944 and M1944/1959 (85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY		
abbreviation	*85-JPSv-TK44, K52, PLK39*	**abbreviation**	*85-PSv*	**abbreviation**	*85-TK44, K52, PLK39*	
weight [*kg*]	*15.9*	**weight [*kg*]**	*9.2*	**length [*mm*]**	*630*	
length [*mm*]	*917 - 922*	**length [*mm*]**	*323 - 327*	**type and size of propellant charge**	*Dgtp 4.7x1.35/490-7.5 or 5x1.5/490-7.5 or Nc7p 11.3x2/18 + Nctp 8x2.7/485*	
initial velocity of projectile [$m.s^{-1}$]	*800*	**type of explosives**	*A-IX-2 or H10*			
maximum range (of fire) [*m*]	*4000*	**weight of blasting filler [*kg*]**	*A-IX-2 - 0.041* *H10 - 0.043*			
		type of fuze	*PD-30*	**weight of propellant charge [*kg*]**	*Dgtp*	*2.80*
		type of tracer	*No. 5 or 5a*		*Nc7p+Nctp*	*2.63*
				material of cartridge case	*Ms (brass)* *Fe (steel)*	
				type of primer	*KV-4;* *1946M; 1949M*	

PACKING			
Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*67*

DESCRIPTION

85-JPSv is used to engage tank, armoured vehicles, reinforced concrete objects and aircraft. This projectile consists of a body (31), windshield (29) and Makarov's cap (30), explosive charges (32). Body is made from hardened steel. At the rear is located the fuze (36) and tracer (38).

COLOR and MARKING			
Body colour:	*Olive*	**Text colour:**	*Black*

FUZE

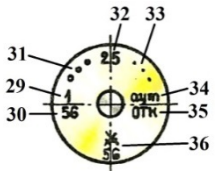
Type	Characteristic
PD-30	*Fuze is inserted into the bottom of shot and is armed by the inertial forces in the travel of the shot to the target.*

SAFETY CONSIDERATION THREAT

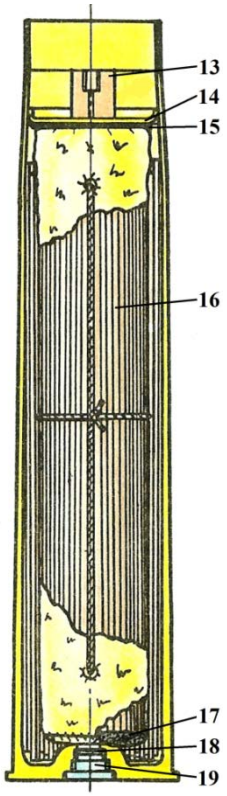
Do not touch and do not move unexploded projectile.

DRAWINGS/CUTAWAY/MARKING/STENCILING

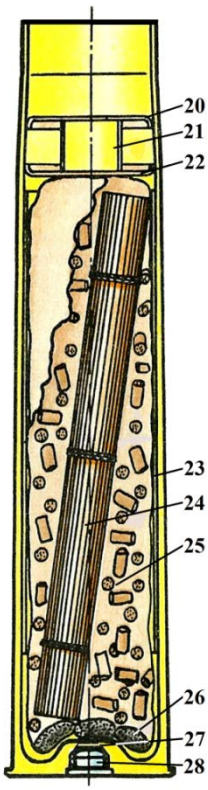
BOTTOM of the cartridge case

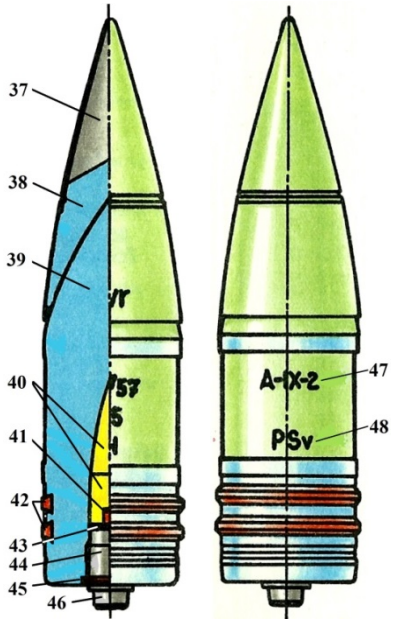


Propellant: „Dgtp“



„Nctp“ + „Nc7p“





LEGEND

1 - Symbol of filling factory of projectile; 2 - Series/year of production of projectile; 3 - Calibre;
4 - Weight sign; 5 - Crimp;
6 - Marking of cartridge case assembly; 7 - Marking of weapon;
8, 9 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder;
10 - Type of black powder in igniter and series/year of manufacture of black powder;
11 - Marking of flash reducing agent;
12 - Series-year of production and symbol of filling factory;
13 - Tube (triangle) expansion - spacer; 14 - Cover; 15 - Decoppering agent; 16 - Propellant;
17 - Igniter;
18 - Paper disc with the propellant data; 19 -Primer; 20 - Upper cover;
21 - Tube expansion - spacer;
22 - Lower cover;
23 - Flash reducing agent;
24 - Propellant “Nctp”;
25 - Propellant “Nc7p”;
26 - Igniter;
27 - Paper disc with the propellant data; 28 -Primer;
29, 30 - Series, year of manufacture of cartridge;
31 - Number of calibration;
32 - Number of melt;
33 - Number of shots;
34 - Symbol of manufacturer;
35 - Symbol of control;
36 - Symbol of inspection;
37 - Windshield;
38 - Makarov’s cap;
39 - Body of projectile;
40 - Explosive charges;
41 - Detonator;
42 - Driving bands;
43 - Cardboard pad;
44 - Fuze;
45 - Copper or aluminium pad;
46 - Tracer
47 - Type of explosive;
48 - Type of projectile - “PSv”

NOTICE

Driving band were made from copper or alloy of “FeS”. Decoppering agent is not used when fitted with a FeS driving band. Explosive A-XI-2 was used by series 20/54 of cartridges. Position No 37 - Aluminium pad was used by series 24/53 of projectiles. Fe (steel) cartridge cases were not used in when fired from the “85TK44”.

	FWP Ammunition	**ANNEX C-27**

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Armour Piercing Full with Tracer*
TYPE	*APF-T*
NAME/ASSIGNED MARK (original)	*85-JPPlSv-TK44, K52, PLK39*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K), 85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12), 85 mm cannon M1952 and M1952/1955 (85 K 52 and 85 K 52/55), 85 mm tank gun M1944 (85 TK 44), 85 mm fortress cannon M 1938/1944 and M1944/1959 (85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*85-JPPlSv-TK44, K52, PLK39*	**abbreviation**	*PPlSv*	**abbreviation**	*Nk 85TK44, 85K52, 85PLK39*
average weight [*kg*]	*15.90*	**weight [*kg*]**	*9.20*	**type and size of propellant charge**	*Dgtp 4.7x1.35/490-7.5 or 5x1.5/490-7.5 or Nc7p 11.3x2/18 + Nctp 8x2.7/485*
		length [*mm*]	*323-327*		
initial velocity of projectile [$m.s^{-1}$]	*800 - 820*	**type of explosives**	---		
		weight of blasting filler [*kg*]	---	**weight of propellant charge [*kg*]**	*Dgtp - 2.80 Nc7p+Nctp - 2.63*
		type of fuze	---	**length [*mm*]**	*630*
				material of cartridge case	*Ms (brass) Fe (steel)*
				weight of decoppering agent [*kg*]	*0.040*
				type of primer	*KV-4, M1946M, M1949M*

PACKING			
Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*58*

DESCRIPTION

85-JPPlSv is used to engage tanks, armoured vehicles, reinforced concrete objects and aircraft. The mark „Pl = plný“ means = „full body“. This projectile consists of body (31), windshield (29) and Makarov's cap (30). Body is made from hardened steel. At the rear is located tracer (38).

FUZE	
Type: ---	**Characteristic:** ---

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

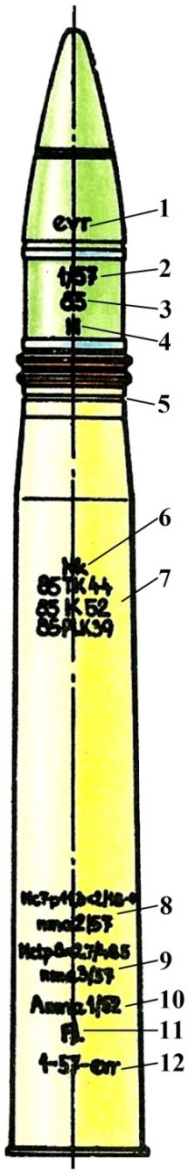
SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

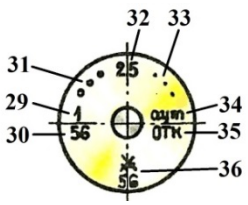
NOTICE

The shell was produced until 1952. The cartridge case is made of brass or steel only with "Dgtp" powder. "Dgtp" powder was used without the flash reducing agent. Driving band were made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. Fe cartridge cases were not used when fired from the 85TK44.

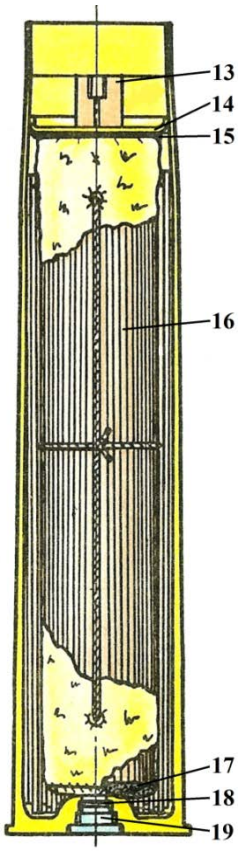
DRAWINGS/CUTAWAY/MARKING/STENCILING



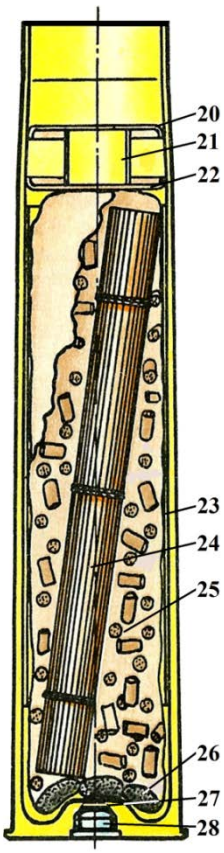
BOTTOM of the cartridge case

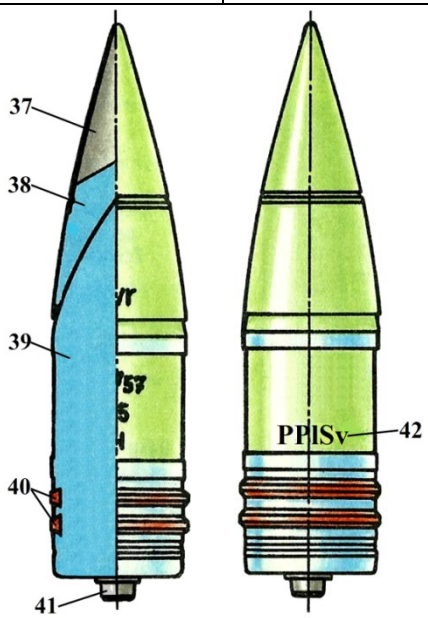


Propellant: „Dgtp“



„Nctp“ + „Nc7p“





LEGEND

1 - Symbol of filling factory of projectile;
2 - Series/year of production of projectile;
3 - Calibre;
4 - Weight sign;
5 - Crimp;
6 - Marking of cartridge case assembly;
7 - Marking of weapon;
8, 9 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder;
10 - Type of black powder in igniter and series/year of manufacture of black powder;
11 - Marking of flash reducing agent;
12 - Series-year of production and symbol of filling factory;
13 - Tube (triangle) expansion - spacer;
14 - Cover;
15 - Decoppering agent;
16 - Propellant;
17 - Igniter; 18 - Paper disc with the propellant data; 19 -Primer;
20 - Upper cover;
21 - Tube expansion - spacer;
22 - Lower cover;
23 - Flash reducing agent;
24 - Propellant “Nctp”;
25 - Propellant “Nc7p”;
26 - Igniter;
27 - Paper disc with the propellant data;
28 -Primer;
29, 30 - Series, year of manufacture of cartridge;
31 - Number of calibration;
32 - Number of melt;
33 - Number of shots;
34 - Symbol of manufacturer;
35 - Symbol of control;
36 - Symbol of inspection;
37 - Windshield;
38 - Makarov’s cap;
39 - Body of projectile;
40 - Driving bands;
41 - Tracer
42 - Type of projectile - “PPlSv”.

FWP Ammunition

ANNEX C-28

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Armour Piercing Rigid with Tracer*
TYPE	*APCR-T*
NAME/ASSIGNED MARK (original)	*85-JPpSv-TK44*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K),* *85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12),* *85 mm cannon M1952 and M1952/1955* *(85 K 52 and 85 K 52/55),* *85 mm tank gun M1944 (85 TK 44),* *85 mm fortress cannon M 1938/1944 and M1944/1959* *(85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE	
abbreviation	*85-JPpSv-TK44*
average weight [*kg*]	*11.70*
initial velocity of projectile [*m.s*$^{-1}$]	*1070*
maximum range (of fire) [*m*]	*1500*

PROJECTILE	
abbreviation	*85-PpSv*
weight [*kg*]	*4.99*
length [*mm*]	*253-257*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Nk 85TK44*
type and size of propellant charge	*Nc7p 11.3x2/18-(14/7) + Nctp 8x2.7/485-(18/1)*
weight of propellant charge [*kg*]	*2.63*
length [*mm*]	*630*
material of cartridge case	*Ms (brass)* *Fe (steel)*
weight of decoppering agent [*kg*]	*0.040*
type of primer	*KV-4, M1946M, M1949M*

PACKING			
Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*68*

DESCRIPTION

85-JPpSv is used in engaging tanks and armoured vehicles. This projectile consists of a body (17), windshield (14), core (15) and tracer (19).

COLOR and MARKING

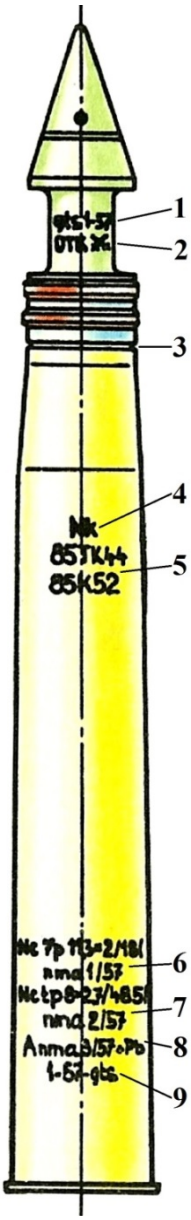
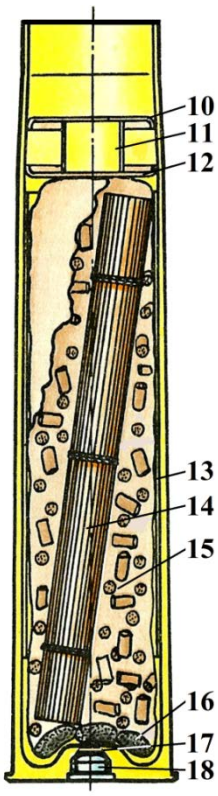
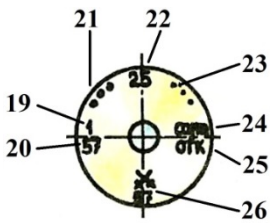
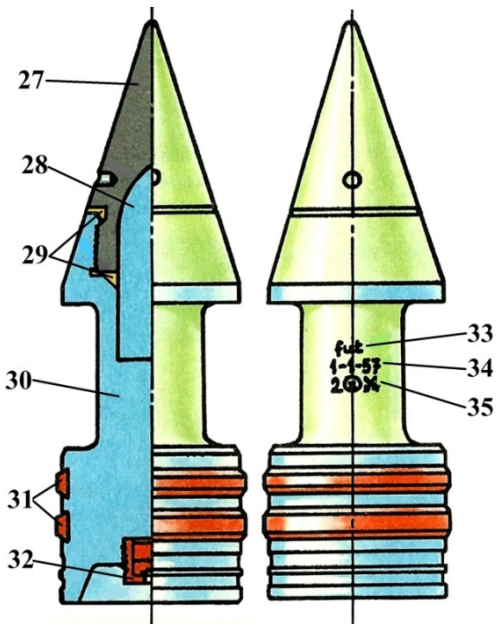
Body colour:	*Olive*
Text colour:	*Black*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Core is made from hardened steel. Driving band were made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. The cartridge case is made of brass or steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
	**Propellant: „Nctp“ + „Nc7p“** 	*1 - Symbol of filling factory, series - year of production of projectile;* *2 - Symbol of control and inspection;* *3 - Crimp;* *4 - Marking of cartridge case assembly;* *5 - Marking of weapon;* *6, 7 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder;* *8 - Type of black powder in igniter and series/year of manufacture of black powder and marking of decoppering agent;* *9 - Series-year of production and symbol of filling factory;* *10 - Upper cover;* *11 - Tube expansion - spacer;* *12 - Lower cover;* *13 - Flash reducing agent;* *14 - Propellant “Nctp”;* *15 - Propellant “Nc7p”;* *16 - Igniter;* *17 - Paper label with the propellant dates;* *18 -Primer;* *19, 20 - Series, year of manufacture of cartridge case;* *21 - Number of calibration;* *22 - Number of melt;* *23 - Number of shots;* *24 - Symbol of manufacturer;* *25 - Symbol of control;* *26 - Symbol of inspection;* *27 - Windshield;* *28 - Core;* *29 - Sealant;* *30 - Body of projectile;* *31 - Driving bands;* *32 - Tracer* *33 - Symbol of mechanical factory;* *34 - Number of melt - series - year of production;* *35 - Number series of core, symbol of control and inspection.*
BOTTOM **of the cartridge case** 		

	FWP Ammunition	ANNEX C-29

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge High Explosive - Fragmentation - Practice*
TYPE	*HE-FRAG- Practice*
NAME/ASSIGNED MARK (original)	*85-JONh-TK44, K52, PLK39*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K),* *85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12),* *85 mm cannon M1952 and M1952/1955* *(85 K 52 and 85 K 52/55),* *85 mm tank gun M1944 (85 TK 44),* *85 mm fortress cannon M 1938/1944 and M1944/1959* *(85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE	
abbreviation	*85-JONh-TK44, K52, PLK39*
length [*mm*]	*940-949*
average weight [*kg*]	*16.35*
initial velocity of projectile [$m.s^{-1}$]	*785*
maximum range (of fire) [*m*]	*13800*

PROJECTILE	
abbreviation	*85-O*
weight [*kg*]	*9.54*
length [*mm*]	*383-390*
type of explosives	---
weight of inert material [*kg*]	*0.741*
type of fuze	*dummy - KTM-1Nh*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Nk 85TK44, K52, PLK39*
type and size of propellant charge	*Dgtp 4.7x1.35/490-7.5 or Dgtp 5x1.5/490-7.5 or Nc7p 11.3x2/18-(14/7) +Nctp 8x2.7/485-(18/1)*
weight of propellant charge [*kg*]	*Dg - 2.80* *Nc - 2.60*
length [*mm*]	*630*
weight of decoppering agent [*kg*]	*0.020*
type of primer	*KV-4, M1946M, M1949M*

PACKING			
Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*68*

DESCRIPTION

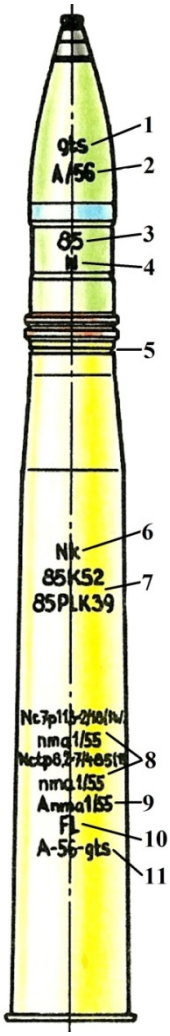
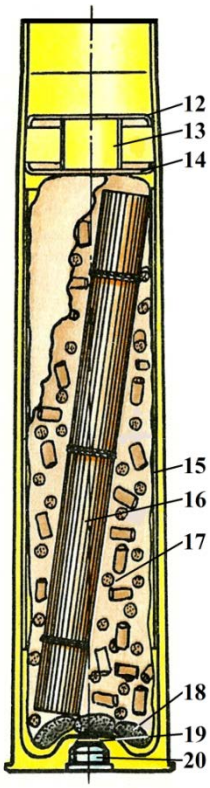
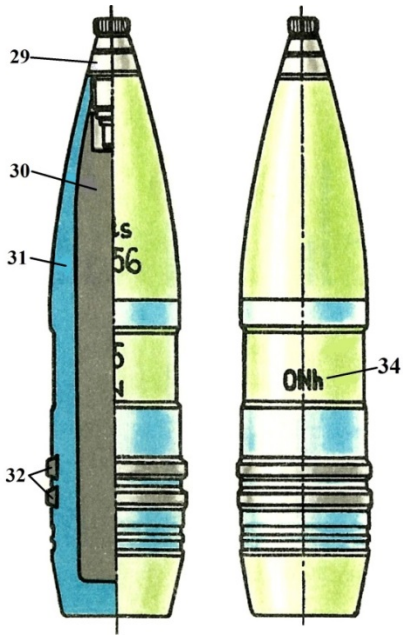
85-JONh is used for training and testing the engagement of light armoured targets, tanks, armoured vehicles and aircraft. This projectile consists of a body (31), Inert filling (30)and blank fuze without explosives (29).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

FUZE	
Type	**Characteristic**
KTM-1 Nh (dummy)	*Dummy fuze without explosives.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
	**Propellant: „Nctp“ + „Nc7p“** 	*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Crimp;* *6 - Marking of cartridge case assembly;* *7 - Marking of weapon;* *8 - Marking of powder (type, shape, dimension) symbol of manufacturer, series/year of production;* *9 - Type of black powder in igniter, symbol of manufacturer, series/year of production;* *10 - Marking of flash reducing agent;* *11 - Series-year of production and symbol of filling factory;* *12 - Upper cover;* *13 - Tube expansion - spacer;* *14 - Lower cover; ,* *15 - Flash reducing agent;* *16 - Propellant “Nctp”;* *17 - Propellant “Nc7p”;* *18 - Igniter;* *19 - Paper label with the propellant data;* *20 -Primer;* *21, 22 - Series, year of manufacture of cartridge;* *23 - Number of calibration;* *24 - Number of melt;* *25 - Number of shots;* *26 - Symbol of manufacturer;* *27 - Symbol of control;* *28 - Symbol of inspection;* *29 - Fuze;* *30 - Inert material;* *31 - Body of projectile;* *32 - Driving band* *33 - Type of projectile - “ONh”*
BOTTOM of the cartridge case		**Marking of bottom projectile**

NOTICE

Driving band is made only from alloy of “FeS”. Decoppering agent is not used when fitted with a FeS driving band. The cartridge case is made of brass or steel.

	FWP Ammunition	**ANNEX C-30**

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Armour Piercing with Tracer - Pract.*
TYPE	*AP-T Pract.*
NAME/ASSIGNED MARK (original)	*85-JPNhSv-TK44, K52, PLK39*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K), 85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12), 85 mm cannon M1952 and M1952/1955 (85 K 52 and 85 K 52/55), 85 mm tank gun M1944 (85 TK 44), 85 mm fortress cannon M 1938/1944 and M1944/1959 (85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*85-JPNhSv-TK44, K52, PLK39*	**abbreviation**	*85-PNhSv*	**abbreviation**	*Nk 85TK44, 85K52, 85PLK39*
average weight [*kg*]	*15.90*	**weight [*kg*]**	*9.20*	**type and size of propellant charge**	*Dgtp 4.7x1.35/490-7.5 or 5x1.5/490-7.5 or Nc7p 11.3x2/18-(14/7)+Nctp 8x2.7/485-(18/1)*
		length [*mm*]	*323-327*		
initial velocity of projectile [$m.s^{-1}$]	*917 - 922*	**type of explosives**	---		
		weight of blasting filler [*kg*]	---	**weight of propellant charge [*kg*]**	*Dgtp - 2.80 or Nctp - 2.63*
maximum range (of fire) [*m*]	*4000*	**type of fuze**	*dummy*	**weight of cartridge case [*kg*]**	*~3.80*
				length [*mm*]	*630*
				weight of decoppering agent [*kg*]	*0.040*
				type of primer	*KV-4; 1946M; 1949M*

PACKING			
Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*67*

DESCRIPTION

85-JPNhSv is used for training and testing the engagement of tanks, armoured vehicles, reinforced concrete objects and aircraft. This projectile consists of a body (31), windshield (29) and Makarov's cap (30), Inert filling (32). Body is made from hardened steel. The fuze (36) is located at the rear with the tracer (38) with ignition and illuminating mixture.

COLOR and MARKING

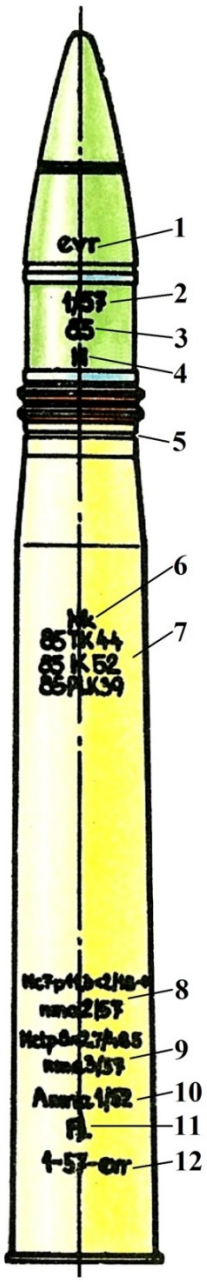
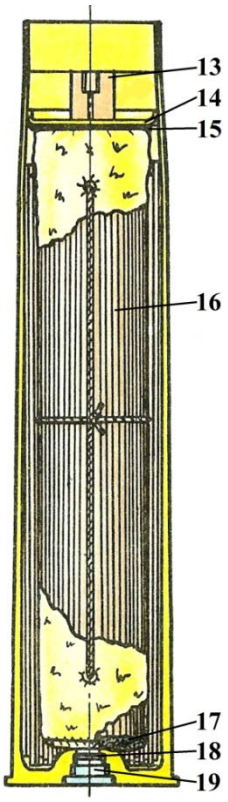
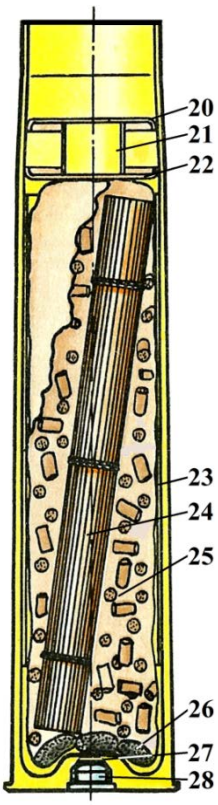
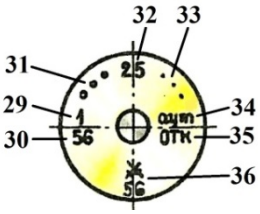
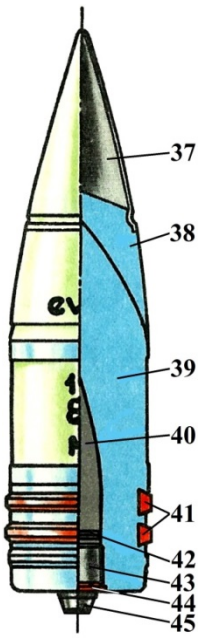
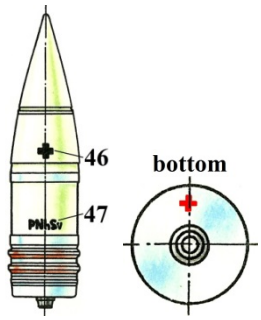
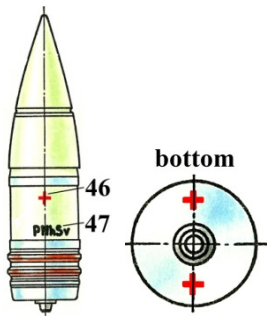
Body colour:	*Olive*
Text colour:	*Black*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

The shell was produced until 1952. The cartridge case is made of brass or steel only with "Dgtp" powder. "Dgtp" powder was used without the flash reducing agent. Driving band is made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. Fe cartridge cases were not used when fired from the 85TK44.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
	**Propellant: „Dgtp“** 	**„Nctp“ + „Nc7p“** 	*1 - Symbol of filling factory of projectile; 2 - Series/year of production of projectile; 3 - Calibre; 4 - Weight sign; 5 - Crimp; 6 - Marking of cartridge case assembly; 7 - Marking of weapon; 8, 9 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder; 10 - Type of black powder in igniter and series/year of manufacture of black powder; 11 - Marking of flash reducing agent; 12 - Series-year of production and symbol of filling factory; 13 - Tube (triangle) expansion - spacer; 14 - Cover; 15 - Decoppering agent; 16 - Propellant; 17 - Igniter; 18 - Paper disc with the propellant data; 19 -Primer; 20 - Upper cover; 21 - Tube expansion - spacer; 22 - Lower cover; 23 - Flash reducing agent; 24 - Propellant “Nctp”; 25 - Propellant “Nc7p”; 26 - Igniter; 27 - Paper disc with the propellant data; 28 -Primer; 29, 30 - Series, year of manufacture of cartridge; 31 - Number of calibration; 32 - Number of melt; 33 - Number of shots; 34 - Symbol of manufacturer; 35 - Symbol of control; 36 - Symbol of inspection; 37 - Windshield; 38 - Makarov’s cap; 39 - Body of projectile; 40 - Inert material; 41 - Driving bands; 42 - Cardboard pad; 43 - Fuze - dummy; 44 - Copper or aluminium pad; 45 - Tracer 46 - Marking - black cross - projectile by 1954; -red cross - projectile since 1955; 47 - Type of projectile - “PNhSv”.*
BOTTOM of the cartridge case 		**by 1954**  **since 1955** 	

	FWP Ammunition	ANNEX C-31

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Fragmentation with Full Charge*
TYPE	*FRAG*
NAME/ASSIGNED MARK (original)	*УО-365К*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K),* *85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12),* *85 mm cannon M1952 and M1952/1955* *(85 K 52 and 85 K 52/55),* *85 mm tank gun M1944 (85 TK 44),* *85 mm fortress cannon M 1938/1944 and M1944/1959* *(85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УО-365К*	**abbreviation**	*О-365К*	**abbreviation**	*УО-365К*
average weight [*kg*]	*16.30*	**weight [*kg*]**	*9.54*	**type and size of propellant charge**	*14/7 ОД + 18/1 ТР*
		length [*mm*]	*390*		
length [*mm*]	*940 - 949*	**type of explosives**	*ТДУ*		
initial velocity of projectile [$m.s^{-1}$]	*785*	**weight of blasting filler [*kg*]**	*0.741*	**weight of propellant charge [*kg*]**	*2.60*
maximum range (of fire) [*m*]	*13800*	**type of fuze**	*КТМ-1, КТМЗ-1*	**material of cartridge case**	*Ms (brass)*
				length [*mm*]	*630*
				type of primer	*КВ-4*

PACKING			
Number of rounds in the crate	*4*	**Weight of full crate [*kg*]**	*89*

DESCRIPTION

УО-365К is used to engage light armoured targets, tanks, armoured vehicles and aircraft. This projectile consists of a body (8), explosive charge (9), fuze (7) and driving band (10).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

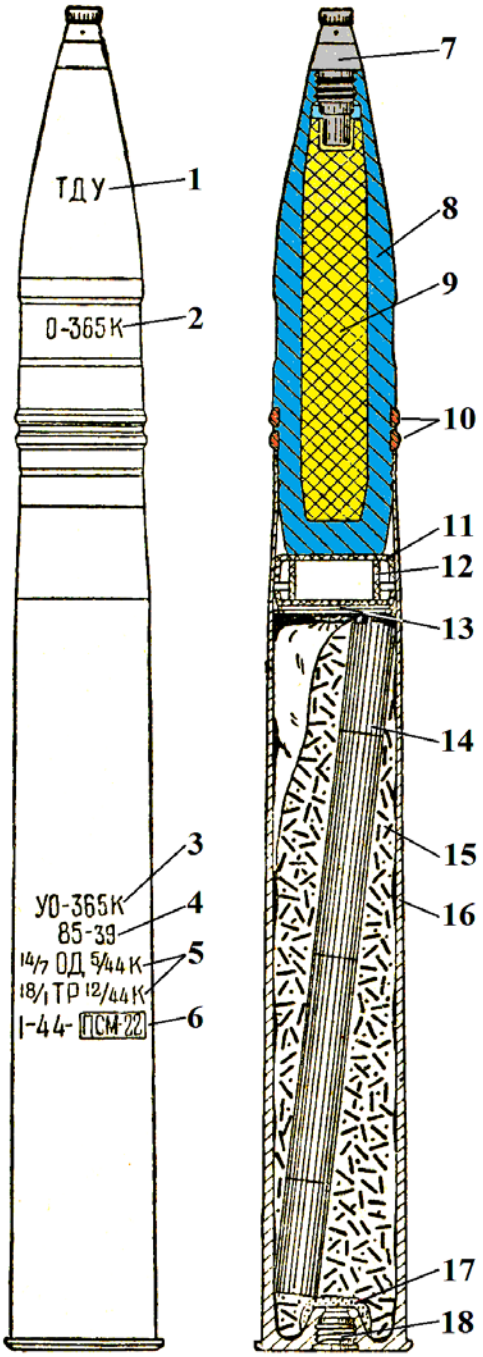
FUZE

Type	Characteristic
КТМ-1, КТМЗ-1	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. Fuzes have an adjustable delay and a held detonator. The fuze does not provide muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	<u>*On one side of the projectile*</u>*:* *1 - Type of explosives;* *2 - Type of projectile - "O-365K"* <u>*On the other side of the projectile*</u>*:* *"80" - Symbol of filling factory;* *"12-47" - Series-year of production;* *"85" - Calibre;* *"H" - Weight sign;* *3 - Marking of cartridge;* *4 - Marking of calibre and weapon;* *5 - Marking of powder (type, shape, dimension) and index of manufacturer;* *6 - Series-year of production and symbol of filling factory;* *7 - Fuze;* *8 - Body of projectile;* *9 - Explosive charge;* *10 - Driving bands;* *11 - Upper cover;* *12 - Support;* *13 - Decoppering agent;* *14, 15 - Propellant;* *16 - Cartridge case;* *17 - Igniter;* *18 – Primer.*

	FWP Ammunition	**ANNEX C-32**

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Fragmentation (with fuze adapter) with Full Charge*
TYPE	*FRAG*
NAME/ASSIGNED MARK (original)	*УО-365К*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K),* *85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12),* *85 mm cannon M1952 and M1952/1955 (85 K 52 and 85 K 52/55),* *85 mm tank gun M1944 (85 TK 44),* *85 mm fortress cannon M 1938/1944 and M1944/1959 (85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		**PROJECTILE**		**CARTRIDGE CASE ASSEMBLY**	
abbreviation	*УО-365К*	**abbreviation**	*О-365К* *АТ-40*	**abbreviation**	*УО-365К* *85-39*
length [*mm*]	*940 - 949*	**length [*mm*]**	*390*	**length [*mm*]**	*630*
average weight [*kg*]	*16.3*	**weight [*kg*]**	*9.54*	**type and size of propellant charge**	*14/7ОД + 18/1 ТР*
initial velocity of projectile [$m.s^{-1}$]	*785*	**type of explosives**	*АТ-40 with booster charge of TNT*		
maximum range (of fire) [*m*]	*13800*	**weight of blasting filler [*kg*]**	*0.660*	**weight of propellant charge [*kg*]**	*2.60*
		type of fuze	*КТМ-1*		
				material of cartridge case	*Ms (brass)*
				type of primer	*КВ-4*

PACKING			
Number of rounds in the crate	*4*	**Weight of full crate [*kg*]**	*89*

DESCRIPTION

УО-365К is used to engage light armoured targets, tank, armoured vehicles and aircraft. This projectile consists of a body (11), fuze adapter (8), booster charge (9), explosive charge (10), fuze (7) and driving band (12).

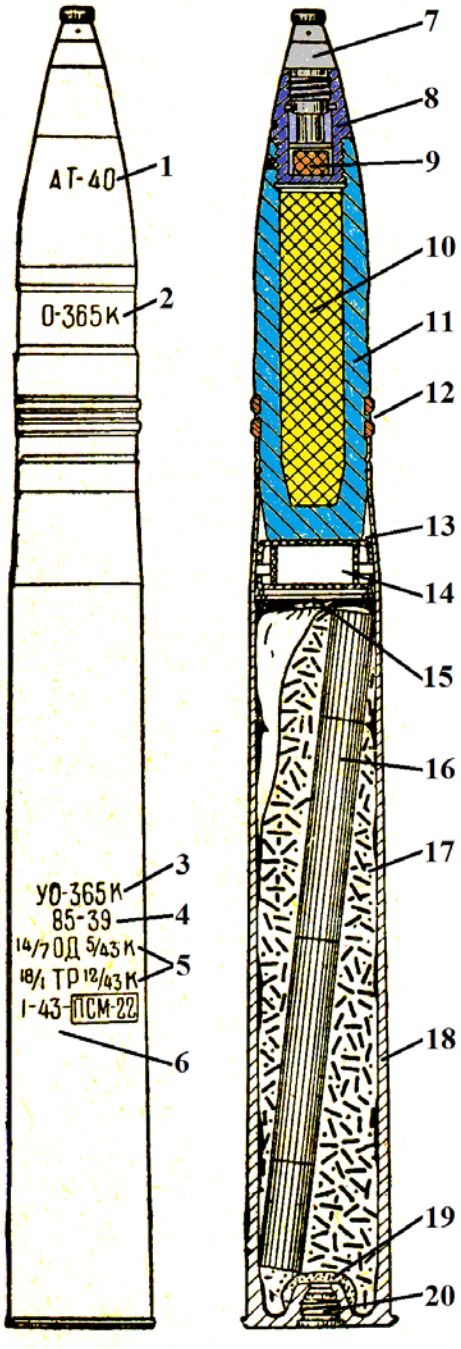
COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

FUZE	
Type	**Characteristic**
КТМ-1	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. Fuzes have an adjustable delay and a held detonator. The fuze does not provide muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	<u>On one side of the projectile</u>: *1 - Type of explosive;* *2 - Type of shot - "O-365K"* <u>On the other side of the projectile</u>: *"80" - Symbol of filling factory;* *"12-47" - Series-year of production;* *"85" - Calibre;* *"H" - Weight sign;* *3 - Marking of cartridge;* *4 - Marking of calibre and weapon;* *5 - Marking of powder (type, shape, dimension) and index of manufacturer;* *6 - Series-year of production and symbol of filling factory;* *7 - Fuze;* *8 – Fuze adapter;* *9 - Booster charge;* *10 - Explosive charge;* *11 - Body of projectile;* *12 - Driving bands;* *13 - Upper cover;* *14 - Support;* *15 - Decoppering agent;* *16, 17 - Propellant;* *18 - Cartridge case;* *19 - Igniter;* *20 – Primer.*

	FWP Ammunition	ANNEX C-33

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Fragmentation with Reduced Charge*
TYPE	*FRAG*
NAME/ASSIGNED MARK (original)	*УО-367*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K),* *85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12),* *85 mm cannon M1952 and M1952/1955* *(85 K 52 and 85 K 52/55),* *85 mm tank gun M1944 (85 TK 44),* *85 mm fortress cannon M 1938/1944 and M1944/1959* *(85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УО-367*	**abbreviation**	*О-365К ТДУ*	**abbreviation**	*УО-367 85 mm "пушка"*
average weight [*kg*]	*15.50*	**weight [*kg*]**	*9.54*	**type and size of propellant charge**	*9/7*
		length [*mm*]	*390*		
length [*mm*]	*940 - 949*	**type of explosives**	*ТДУ*		
initial velocity of projectile [$m.s^{-1}$]	*655*	**weight of blasting filler [*kg*]**	*0.741*	**weight of propellant charge [*kg*]**	*1.66*
maximum range (of fire) [*m*]		**type of fuze**	*КТМ-1, КТМЗ-1*	**material of cartridge case**	*Ms (brass)*
				length [*mm*]	*630*
				type of primer	*КВ-4*

PACKING			
Number of rounds in the crate	*4*	**Weight of full crate [*kg*]**	*86*

DESCRIPTION

УО-367 is used to engage light armoured targets, tanks, armoured vehicles and aircraft. This projectile consists of a body (10), explosive charge (11), fuze (9) and driving band (12).

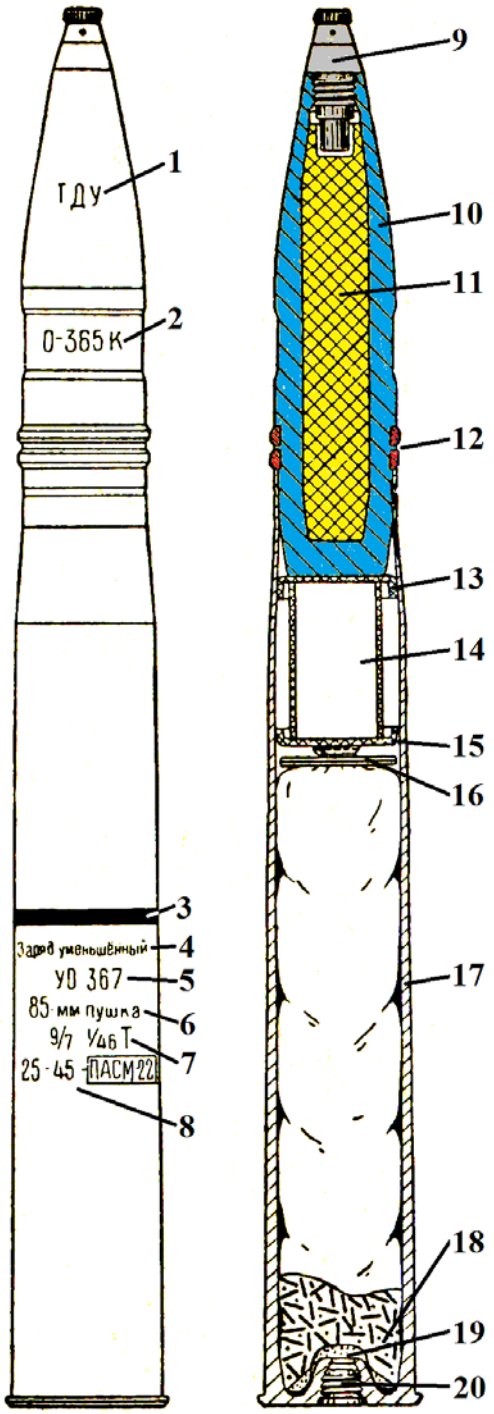
COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

FUZE	
Type	**Characteristic**
КТМ-1, КТМЗ-1	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. Fuzes have an adjustable delay and a held detonator. The fuze does not provide muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	<u>*On one side of the projectile*</u>*:* *1 - Type of explosive;* *2 - Type of projectile - "O-365K"* <u>*On the other side of the projectile*</u>*:* *"80" - Symbol of filling factory;* *"12-47" - Series-year of production;* *"85" - Calibre;* *"H" - Weight sign;* *3 - Graphic marking (black ring) of cartridge;* *4 - Inscription for Reduced Charge = „Заряд уменьшенный";* *5 - Marking of cartridge;* *6 - Marking of calibre and weapon;* *7 - Marking of powder (type, shape, dimension) and index of manufacturer;* *8 - Series-year of production and symbol of filling factory;* *9 - Fuze;* *10 - Body of projectile;* *11- Explosive charge;* *12 - Driving bands;* *13 - Upper cover;* *14 - Support;* *15 - Bottom cover;* *16 - Decoppering agent;* *17 - Cartridge case;* *18 - Propellant;* *19 - Igniter;* *20 - Primer.*

	FWP Ammunition	**ANNEX C-34**

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Armour Piercing with Blunt Tip with Tracer*
TYPE	*APBT-T*
NAME/ASSIGNED MARK (original)	*УБР-365*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K),* *85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12),* *85 mm cannon M1952 and M1952/1955 (85 K 52 and 85 K 52/55),* *85 mm tank gun M1944 (85 TK 44),* *85 mm fortress cannon M 1938/1944 and M1944/1959 (85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		**PROJECTILE**		**CARTRIDGE CASE ASSEMBLY**	
abbreviation	*УБР-365*	**abbreviation**	*БР-365 МД-7*	**abbreviation**	*УБР-365 85-39*
average weight [*kg*]	*15.70*	**weight [*kg*]**	*9.20*	**length [*mm*]**	*630*
length [*mm*]	*940 - 949*	**length [*mm*]**	*390*	**type and size of propellant charge**	*14/7*
initial velocity of projectile [$m.s^{-1}$]	*792*	**type of explosives**	*A-IX-2*		
maximum range (of fire) [*m*]	*4000*	**weight of blasting filler [*kg*]**	*0.065*	**weight of propellant charge [*kg*]**	*2.60*
		type of fuze	*МД-7*		
				material of cartridge case	*Ms (brass)*
				type of primer	*КВ-4*

PACKING			
Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*67*

DESCRIPTION

УБР-365 is used to engage tank, armoured vehicles and reinforced concrete objects. This projectile consists of a body (9), windshield (8), explosive charge (10) and fuze (12) with tracer.

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

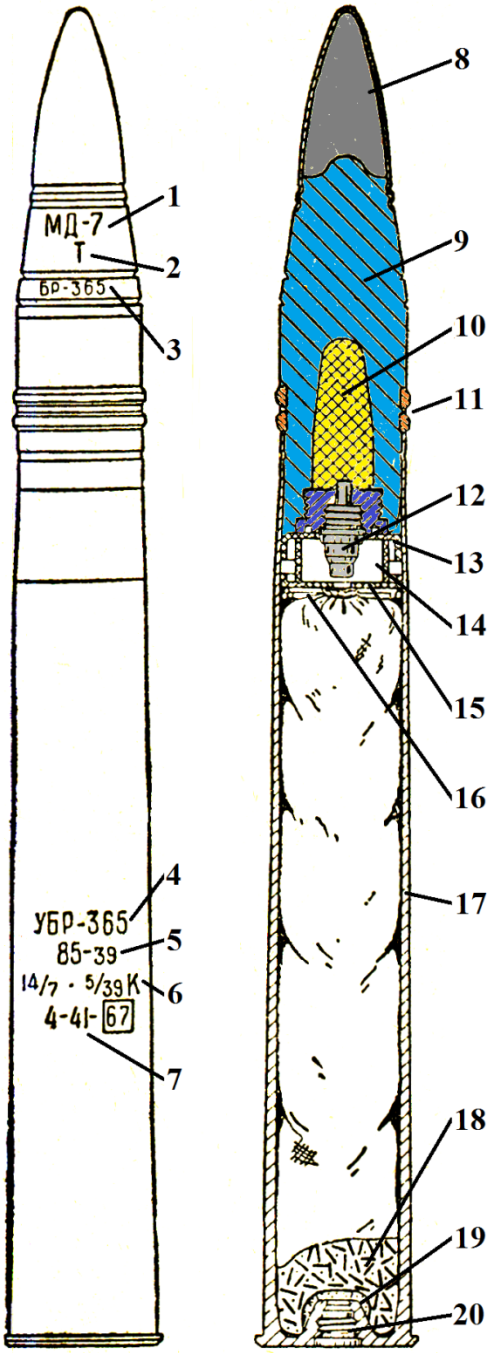
FUZE	
Type	**Characteristic**
МД-7	*Fuze is inserted into the bottom of shot and is initiated by the inertial forces in the travel of the shot to the target.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Body is made from hardened steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*<u>On one side of the projectile</u>:* *1 - Type of fuze;* *2 - Type of explosives;* *3 - Type of projectile - "БР-365"* *<u>On the other side of the projectile</u>:* *"12" - Symbol of filling factory;* *"8-41" - Series-year of production;* *"85" - Calibre;* *"H" - Weight sign;* *4 - Marking of cartridge;* *5 - Marking of calibre and weapon;* *6 - Marking of powder (type, shape, dimension) and index of manufacturer;* *7 - Series-year of production and symbol of filling factory;* *8 - Windshield;* *9 - Body of projectile;* *10 - Explosive charge;* *11 - Driving bands;* *12 - Fuze with tracer;* *13 - Upper cover;* *14 - Support;* *15 - Bottom cover;* *16 - Decoppering agent;* *17 - Cartridge case;* *18 - Propellant;* *19 - Igniter;* *20 – Primer.*

FWP Ammunition

ANNEX C-35

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Armour Piercing with Sharp Tip with Tracer*
TYPE	*APST-T*
NAME/ASSIGNED MARK (original)	*УБР-365К*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K),* *85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12),* *85 mm cannon M1952 and M1952/1955* *(85 K 52 and 85 K 52/55),* *85 mm tank gun M1944 (85 TK 44),* *85 mm fortress cannon M 1938/1944 and M1944/1959* *(85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УБР-365К*	**abbreviation**	*БР-365К* *МД-8*	**abbreviation**	*УБР-365К* *85-39*
average weight [*kg*]	*15.70*	**weight [*kg*]**	*9.342*	**type and size of propellant charge**	*14/7*
length [*mm*]	*822 - 826*	**length [*mm*]**	*290*		
initial velocity of projectile [*m.s*$^{-1}$]	*792*	**type of explosives**	*A-IX-2*	**length [*mm*]**	*630*
maximum range (of fire) [*m*]	*4000*	**weight of blasting filler [*kg*]**	*0.048*	**weight of propellant charge [*kg*]**	*2.48*
		type of fuze	*МД-8*	**material of cartridge case**	*Ms (brass)*
				type of primer	*КВ-4*

PACKING

Number of rounds in the crate	*3 or 4*	**Weight of full crate [*kg*]**	*67 or 87*

DESCRIPTION

УБР-365К is used to engage tanks, armoured vehicles and reinforced concrete objects. This projectile consists of a body (8), explosive charge (10). Body is made from hard steel. At the rear is located the fuze (11) with tracer.

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

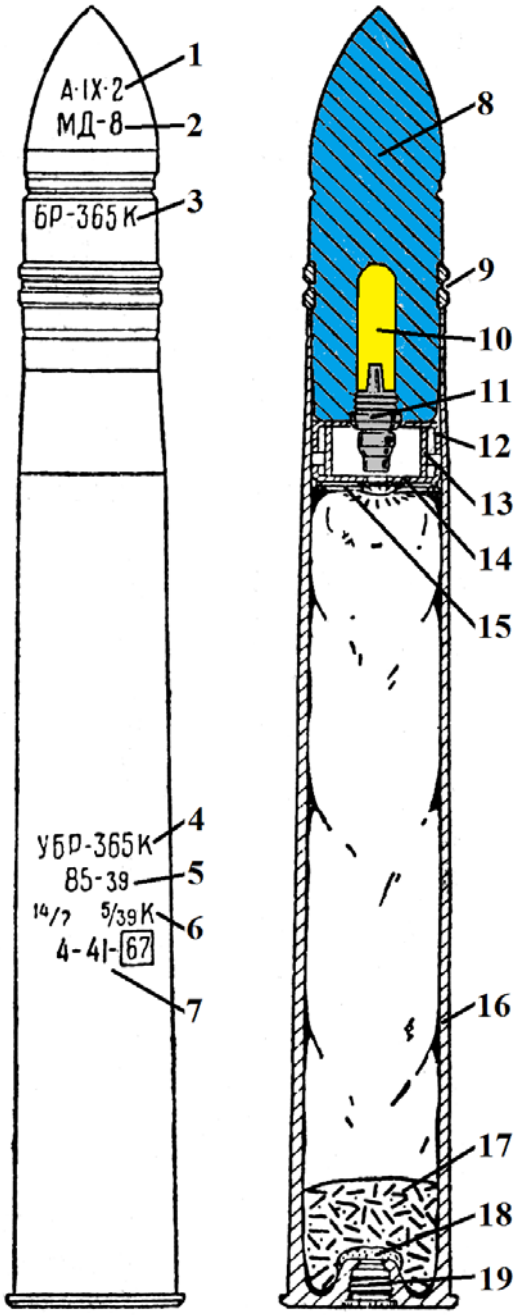
Type	Characteristic
МД-8	*Fuze is inserted into the bottom of shot and is initiated by the inertial forces in the travel of the shot to the target.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Body is made from hardened steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*<u>On one side of the projectile</u>:* *1 - Type of explosives;* *2 - Type of fuze;* *3 - Type of shot - "БР-365К"* *<u>On the other side of the projectile</u>:* *"80" - Symbol of filling factory;* *"1-47" - Series-year of production;* *"85" - Calibre;* *"H" - Weight sign;* *4 - Marking of cartridge;* *5 - Marking of calibre and weapon;* *6 - Marking of powder (type, shape, dimension) and index of manufacturer;* *7 - Series-year of production and symbol of filling factory;* *8 - Body of projectile;* *9 - Driving bands;* *10 - Explosive charge;* *11 - Fuze;* *12 - Upper cover;* *13 - Support;* *14 - Bottom cover;* *15 - Decoppering agent;* *16 - Cartridge case;* *17 - Propellant;* *18 - Igniter;* *19 – Primer.*

	FWP Ammunition	**ANNEX C-36**

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Armour Piercing Reduced Calibre with Tracer*
TYPE	*APRC-T*
NAME/ASSIGNED MARK (original)	*УБР-365П*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *85 mm anti-aircraft gun M1939 (85 PLK 39 or 52-K),* *85 mm anti-aircraft gun M1943 (85 PLK 43 or KS-12),* *85 mm cannon M1952 and M1952/1955* *(85 K 52 and 85 K 52/55),* *85 mm tank gun M1944 (85 TK 44),* *85 mm fortress cannon M 1938/1944 and M1944/1959* *(85 PK 38/44 and 85 PK 44/59)*

CARTRIDGE		**PROJECTILE**		**CARTRIDGE CASE ASSEMBLY**	
abbreviation	*УБР-365П*	**abbreviation**	*БР-365П*	**abbreviation**	*УБР-365П 85-39*
average weight [*kg*]	*11.42*	**weight [*kg*]**	*4.99*	**type and size of propellant charge**	*14/7 CB*
		length [*mm*]	*256*		
length [*mm*]	*852 - 856*	**type of explosives**	---		
initial velocity of projectile [$m.s^{-1}$]	*1050*	**weight of blasting filler [*kg*]**	---	**weight of propellant charge [*kg*]**	*2.50*
		type of fuze	---		
maximum range (of fire) [*m*]	*15650*			**material of cartridge case**	*Ms (brass)*
				length [*mm*]	*630*
				type of primer	*КВ-4*

PACKING			
Number of rounds in the crate	*3 or 4*	**Weight of full crate [*kg*]**	*67 or 87*

DESCRIPTION

УБР-365П is used to engage tanks and armoured vehicles. This projectile consists of a body (17), windshield (14), core (15) and tracer (19).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

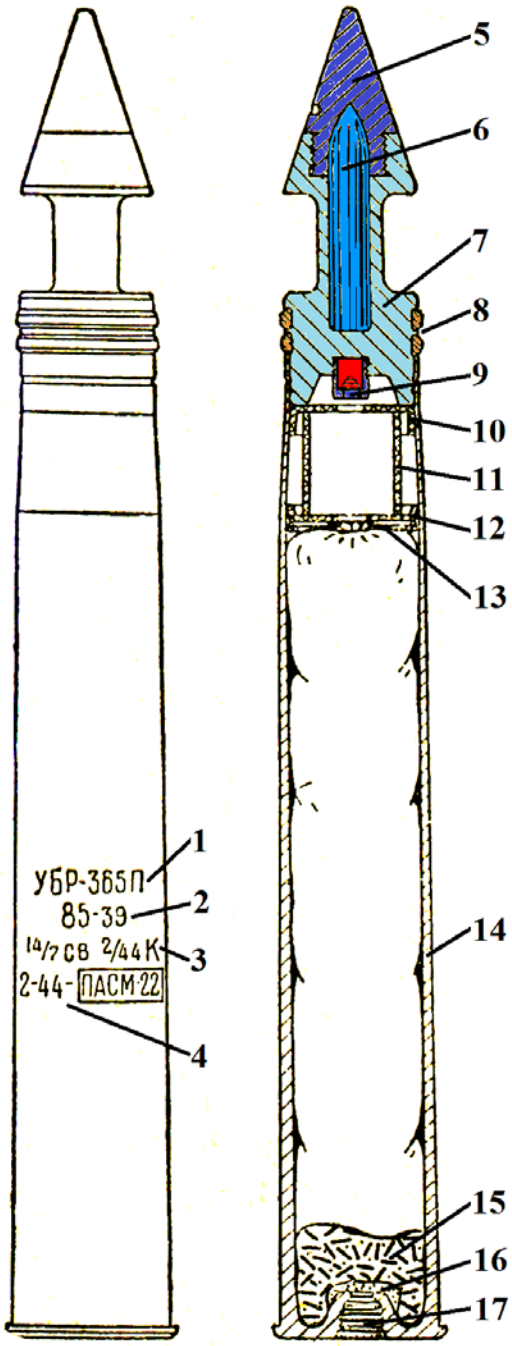
FUZE	
Type	**Characteristic**
---	---

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Core is made from hardened steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Marking of cartridge;* *2 - Marking of calibre and weapon;* *3 - Marking of powder (type, shape, dimension) and index of manufacturer;* *4 - Series-year of production and symbol of filling factory;* *5 - Windshield;* *6 - Core;* *7 - Body of projectile;* *8 - Driving bands;* *9 - Tracer;* *10 - Upper cover;* *11 - Support;* *12 - Bottom cover;* *13 - Decoppering agent;* *14 - Cartridge case;* *15 - Propellant;* *16 - Igniter;* *17 – Primer.*

	FWP Ammunition	**ANNEX C-37**

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Armour Piercing with Tracer*
TYPE	*AP-T*
NAME/ASSIGNED MARK (original)	*85-JPSv-PLK44*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by:* *85 mm anti-aircraft gun M1944 (85 PLK 44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*85-JPSv-PLK44*	**abbreviation**	*85-PSv-PLK44*	**abbreviation**	*Nk 85PLK44*
length [*mm*]	*917-923*	**weight [*kg*]**	*9.20*	**type and size of propellant charge**	*Dgtp 5.7x1.7/330+170-8.5 or Dgtp 5x1.5/250-8.15*
average weight [*kg*]	*16.18*	**length [*mm*]**	*324-328*		
initial velocity of projectile [$m.s^{-1}$]	*835*	**type of explosive**	*H-10 or A-IX-2*	**weight of propellant charge [*kg*]**	*2.80*
maximum range (of fire) [*m*]		**weight of explosive [*kg*]**	*0.043*	**length [*mm*]**	*630*
		type of fuze	*PD-30*	**type of primer**	*KV-4; 1946M; 1949M*

PACKING			
Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*60*

DESCRIPTION

85-JPSv-PLK44 is used to engage tanks, armoured vehicles, reinforced concrete objects and aircraft. This projectile consists of a body (19), windshield (17) and Makarov's cap (18), explosive charges (20). Body is made from hardened steel. At the rear is located the fuze (24) with tracer.

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

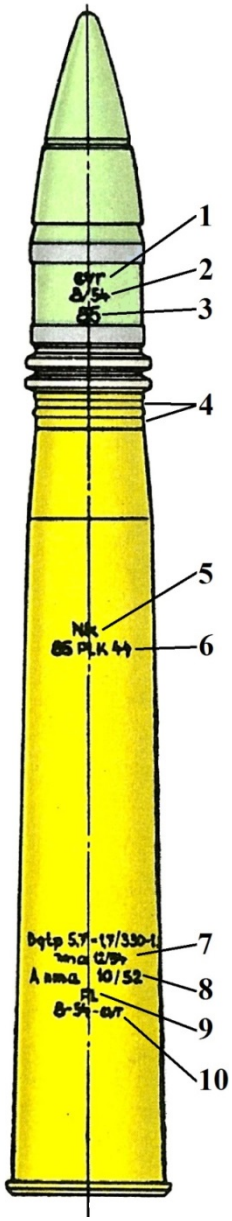
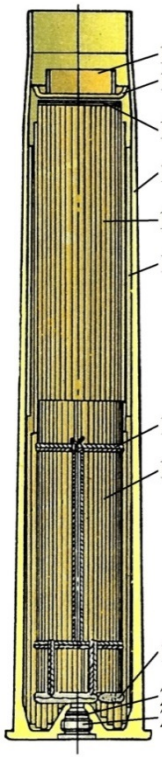
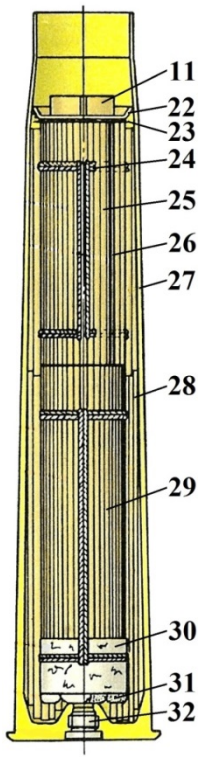
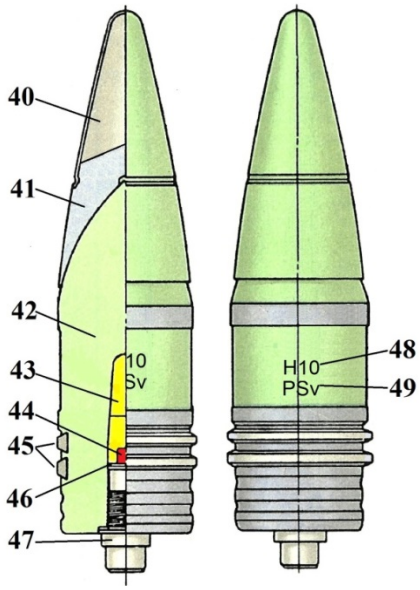
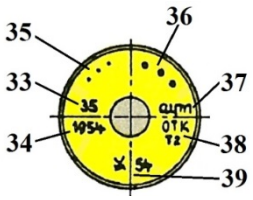
Type	Characteristic
PD-30	*Fuze is inserted into the bottom of shot and is initiated by the inertial forces in the travel of the shot to the target.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band were made only from alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. The cartridge is made of brass.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
			*1 - Symbol of filling factory of projectile;* *2 - Series and year of production of projectile;* *3 – Calibre;* *4 - Crimps;* *5 - Marking of cartridge case assembly; 6 - Marking of weapon;* *7 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder;* *8 - Type of black powder in igniter and series/year of manufacture of black powder;* *9 - Marking of flash reducing agent;* *10 - Series-year of production and symbol of filling factory;* *11 - Tube expansion - spacer;* *12 - Cover; 13 - Decoppering agent;* *14 - Cartridge case;* *15 - Propellant - free;* *16 - Flash reducing agent;* *17 - Silk cord;* *18 - Propellant - bottom bunch;* *19 - Igniter;* *20 - Paper disc with data of propellant;* *21 - Primer;* *22 - Cover;* *23 - Decoppering agent;* *24 - Silk cord;* *25 - Propellant - upper bunch;* *26 - Flash reducing agent;* *27 - Cartridge case;* *28 - Propellant - free;* *29 - Propellant - bottom bunch;* *30 - Pocket in igniter;* *31 - Igniter; 32 - Primer;* *33, 34 - Series and year of manufacture of cartridge case;* *35 - Number of calibration;* *36 - Number of shots;* *37 - Symbol of manufacturer;* *38 - Symbol of control;* *39 - Symbol of inspection;* *40 - Windshield;* *41 - Makarov's cap;* *42 - Body of projectile;* *43 - Explosive charges;* *44 - Detonator;* *45 - Driving bands;* *46 - Cardboard pad;* *47 - Fuze with tracer* *48 - Type of explosive;* *49 - Type of projectile - "PSv".*
BOTTOM of the cartridge case			
			

	FWP Ammunition	ANNEX C-38

FIELD of AMMUNITION	*artillery, anti-aircraft artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Timing - High Explosive - Fragmentation.*
TYPE	*T-HE-FRAG*
NAME/ASSIGNED MARK (original)	*85-JČ-PLK44*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 85 mm anti-aircraft gun M1944 (85 PLK 44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*85-JČ-PLK44*	**abbreviation**	*85-Č-PLK44*	**abbreviation**	*Nk 85PLK44*
length [*mm*]	*964-974*	**weight [*kg*]**	*9.20*	**type and size of propellant charge**	*Dgtp 5.7x1.7/330+170-8.5 or Dgtp 5x1.5/250-8.15*
average weight [*kg*]	*16.20*	**length [*mm*]**	*409-414*		
initial velocity of projectile [$m.s^{-1}$]	*870*	**type of explosive**	*TNT*	**weight of propellant charge [*kg*]**	*2.80*
maximum range (of fire) [*m*]		**type of smoke and flash element**	*TNT + DU-5*	**weight of decoppering agent [*kg*]**	*0.020*
		weight of "TNT+DU-5" [*kg*]	*0.660*	**length [*mm*]**	*630*
		type of fuze	*mčz S-30 + VDM, mčz S-30 rp*	**type of primer**	*KV-4*

PACKING

Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*60*

DESCRIPTION

85-JČ-PLK44 is used when engaging aircraft. This projectile consists of a body (39) with fuze (36) with secured detonator, explosive charges (40), and explosive charges with smoke and flash element (42).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

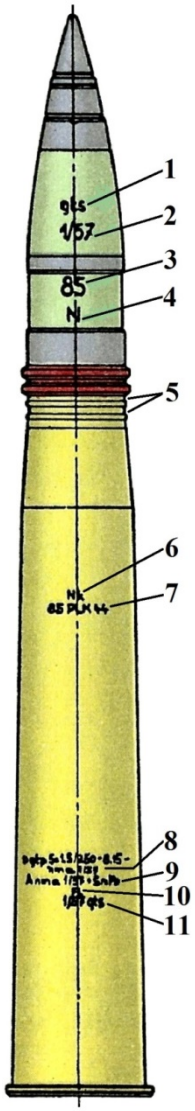
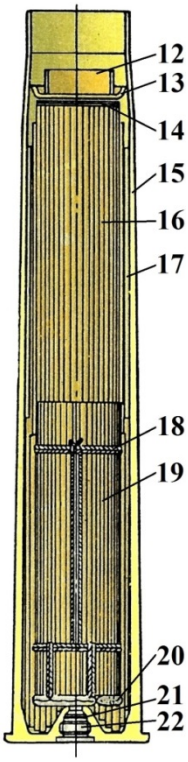
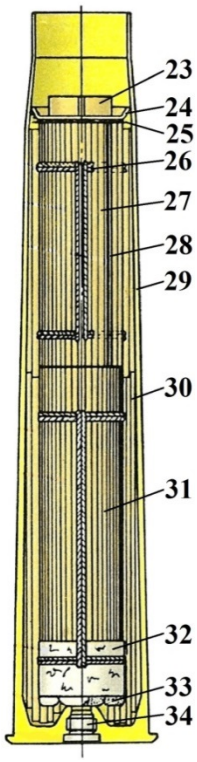
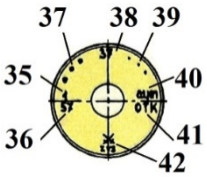
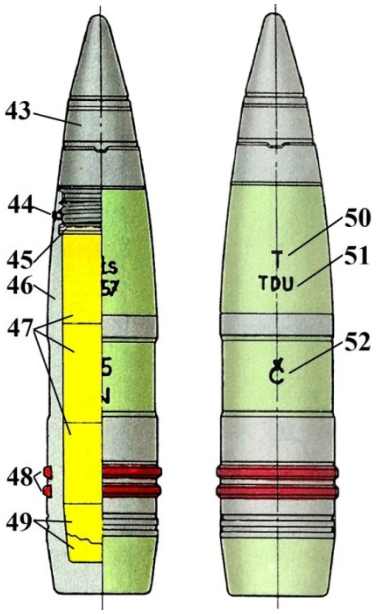
FUZE

Type	Characteristic
mčz S-30+VDM, mčz S-30 rp	*Fuze is screwed into the nose. It has a clockwork sprung mechanical time mechanism. The detonator is secured.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
			*1 - Symbol of filling factory of projectile; 2 - Series and year of production of projectile;* *3 - Calibre; 4 - Weight sign;* *5 - Crimps; 6 - Marking of cartridge case assembly; 7 - Marking of weapon; 8 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder;* *9 - Type of black powder in igniter and series/year of manufacture of black powder; 10 - Marking of flash reducing agent; 11 - Series-year of production and symbol of filling factory; 12 - Tube expansion - spacer; 13 - Cover;* *14 - Decoppering agent; 15 - Cartridge case; 16 - Propellant - loose;* *17 - Flash reducing agent;* *18 - Silk cord; 19 - Propellant - bottom bunch; 20 - Igniter;* *21 - Paper label with data of propellant; 22 - Primer;* *23 - Tube expansion - spacer;* *24 - Cover; 25 - Decoppering agent;* *26 - Silk cord; 27 - Propellant - upper bunch; 28 - Flash reducing agent;* *29 - Cartridge case;* *30 - Propellant - loose;* *31 - Propellant - bottom bunch;* *32 - Pocket in igniter;* *33 - Igniter; 34 - Primer;* *35, 36 - Series and year of manufacture of cartridge case;* *37 - Number of calibration;* *38 - Number of melt;* *39 - Number of shots;* *40 - Symbol of manufacturer;* *41 - Symbol of control;* *42 - Symbol of inspection;* *43 - Fuze with secured detonator "VDM";* *44 - Safety screw;* *45 - Pad;* *46 - Body of projectile;* *47 - Explosive charges (TNT);* *48 - Driving bands;* *49 - Explosive charges with smoke and flash element (TNT + DU-5);* *50 - Type of explosive;* *51 - Type of explosive and type of smoke and flash element* *52 - Type of projectile - "Č".*
BOTTOM of the cartridge case 			

	FWP Ammunition	**ANNEX C-39**

FIELD of AMMUNITION	*Artillery*
CALIBER	*85 mm*
NAME	*85 mm Fixed Cartridge Timing - High Explosive - Fragmentation - Practice*
TYPE	*T-HE-FRAG- Practice*
NAME/ASSIGNED MARK (original)	*85-JČNh-PLK44*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by:* *85 mm anti-aircraft gun M1944 (85 PLK 44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*85-JČNh-PLK44*	**abbreviation**	*85-ČNh-PLK44*	**abbreviation**	*Nk 85PLK44*
length [*mm*]	*964-974*	**weight [*kg*]**	*9.20*	**type and size of propellant charge**	*Dgtp 5.7x1.7/330+170-8.5 or Dgtp 5x1.5/250-8.15*
average weight [*kg*]	*16.20*	**length [*mm*]**	*409-414*		
		type of explosive	---		
initial velocity of projectile [$m.s^{-1}$]	*870*			**weight of propellant charge [*kg*]**	*2.80*
maximum range (of fire) [*m*]		**type of smoke and flash element**	---		
		type of fuze	*dummy (mčz S-30Nh +VDMNh or mčz S-30 rpNh)*	**weight of decoppering agent [*kg*]**	*0.020*
				length [*mm*]	*630*
				type of primer	*KV-4*

PACKING			
Number of rounds in the crate	*3*	**Weight of full crate [*kg*]**	*60*

DESCRIPTION

85-JČNh-PLK44 is used for training and testing the engagement of aircraft. This projectile consists of a body (37) with fuze - dummy (36), Inert filling (38).

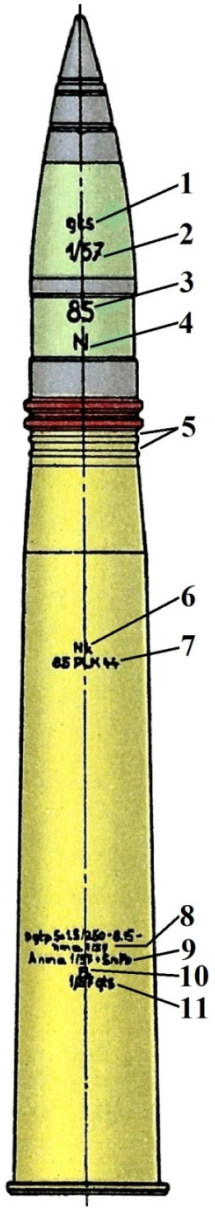
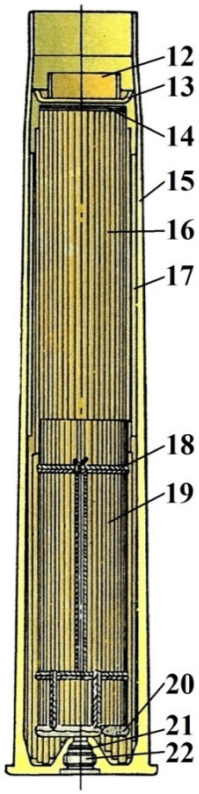
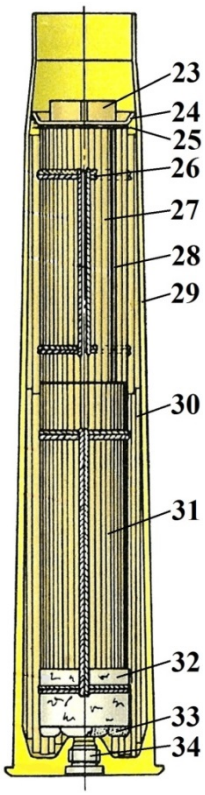
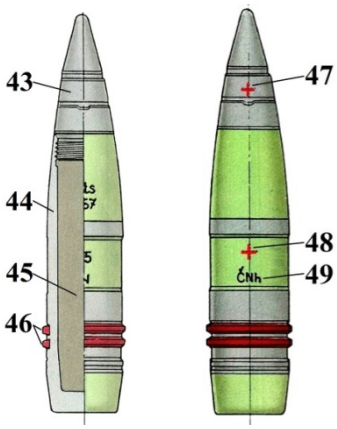
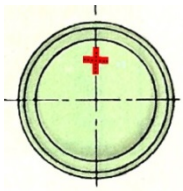
COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

FUZE	
Type	**Characteristic**
dummy - mčz S-30Nh +VDMNh or mčz S-30 rpNh	*Fuze without explosives.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
			*1 - Symbol of filling factory of projectile; 2 - Series and year of production of projectile;* *3 - Calibre; 4 - Weight sign;* *5 - Crimps; 6 - Marking of cartridge case assembly; 7 - Marking of weapon; 8 - Marking of powder (type, shape, dimension) and manufacturer, series/year of manufacture of powder;* *9 - Type of black powder in igniter and series/year of manufacture of black powder; 10 - Marking of flash reducing agent; 11 - Series-year of production and symbol of filling factory; 12 - Tube expansion - spacer; 13 - Cover;* *14 - Decoppering agent; 15 - Cartridge case; 16 - Propellant - loose;* *17 - Flash reducing agent;* *18 - Silk cord; 19 - Propellant - bottom bunch; 20 - Igniter;* *21 - Paper label with data of propellant; 22 - Primer;* *23 - Tube expansion - spacer;* *24 - Cover; 25 - Decoppering agent;* *26 - Silk cord; 27 - Propellant - upper bunch; 28 - Flash reducing agent;* *29 - Cartridge case;* *30 - Propellant - loose;* *31 - Propellant - bottom bunch;* *32 - Pocket in igniter;* *33 - Igniter;* *34 - Primer;* *35, 36 - Series and year of manufacture of cartridge case;* *37 - Number of calibration;* *38 - Number of melt;* *39 - Number of shots;* *40 - Symbol of manufacturer;* *41 - Symbol of control;* *42 - Symbol of inspection;* *43 - Fuze - dummy;* *44 - Body of projectile;* *45 - Inert material;* *46 - Driving bands* *47 - Red cross - marking of type fuze - dummy;* *48 - Red cross - marking of type projectile;* *49 - Type of projectile - "ČNh".*
			
BOTTOM of the cartridge case	**BOTTOM of the projectile**		
			

FWP Ammunition

ANNEX C-40

FIELD of AMMUNITION	*artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge High Explosive - Fragmentation with Full Charge*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*100-JOF- vn-TK, K53, ShK44*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 100 mm tank gun D10-TG or D10-T2S (100TK), 100 mm field gun M1953 (100K53), 100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE	
abbreviation	*100-JOF- vn-TK, K53, ShK44*
length [*mm*]	*1091 - 1105*
average weight [*kg*]	*30.20*
initial velocity [$m.s^{-1}$]	*930*
maximum range (of fire) [*m*]	*21020*

PROJECTILE	
abbreviation	*100-OF*
weight [*kg*]	*15.60*
length [*mm*]	*492 - 502*
type of explosive	*TNT*
weight of bursting charge [*kg*]	*1.46*
type of fuze	*nz10av, nz10bv, nz 11, B-429*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Nk 100 ShK 44, K 53, TK*
type and size of propellant charge	*Dgtp 7.5x2/360+Dgtp 7.5x2/180-8.5 or Dgtp 5.6x1.85/260-8.15 or Ngtp 5.6x1.78/260-7.85-(NDT-3)*
weight of propellant charge [*kg*]	*5.60*
length [*mm*]	*696*
material of cartridge case	*Ms (brass) Fe (steel)*
weight of decoppering agent [*kg*]	*0.060*
type of primer	*KV-4, KV-13, zš-1a*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*Ms - 88; Fe - 76*

DESCRIPTION

100-JOF-vn is used to engage light armoured targets, tanks, armoured vehicles, reinforced concrete objects. This projectile consists of the body (35), explosive charge (34) and fuze (33).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
nz10av, nz10bv, nz 11, B-429	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. The fuze has an adjustable delay, secured detonator and provides muzzle safety Fuze "nz 11" is used since 1960.*

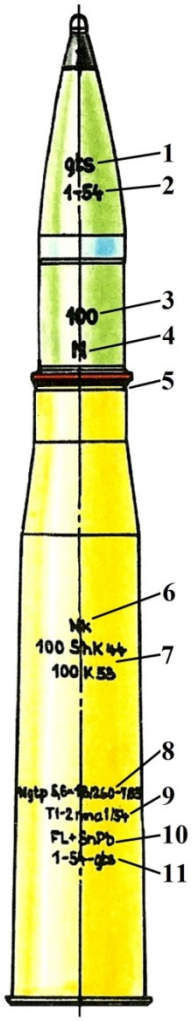
SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

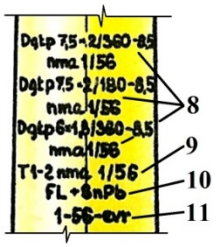
NOTICE

Driving band is made from copper + nickel (upper driving band) and copper (bottom driving band).
The cartridge is made of brass or steel.

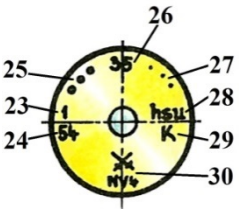
DRAWINGS/CUTAWAY/MARKING/STENCILING



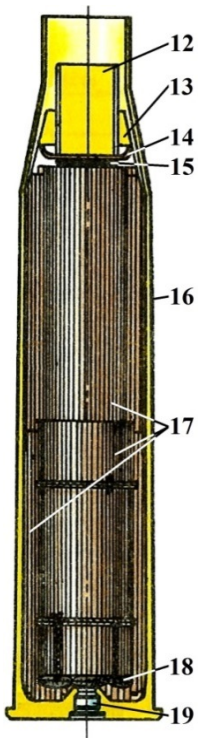
or



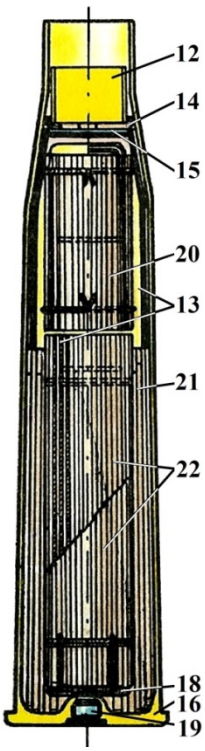
BOTTOM of the cartridge case

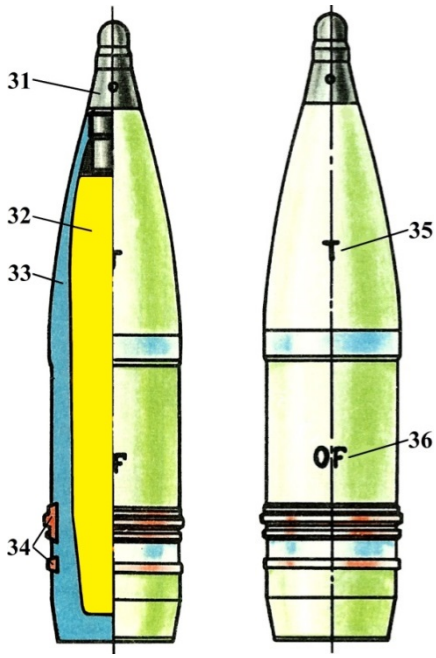


Propellant: „Ngtp“



„Dgtp“





LEGEND

1 - Symbol of filling factory;
2 - Series and year of production of projectile;
3 - Calibre;
4 - Weight sign;
5 - Crimp (cannelluring since 3/55);
6 - Marking of cartridge case assembly;
7 - Marking of weapon (and “100 TK” since 1959);
8 - Marking of powder (type, shape, dimension) and Manufacturer, series, year of manufacture of powder;
9 - Type of black powder in igniter and symbol of manufacturer, series, year of manufacture of black powder;
10 - Flash reducing agent + type of decoppering agent;
11 - Series- year of production and symbol of filling factory;
12 – Expansion tube - spacer;
13 - Flash reducing agent;
14 - Cover;
15 - Decoppering agent;
16 - Cartridge case;
17 - Propellant;
18 - Igniter;
19 - Primer;
20 - Propellant - upper bunch;
21 - Propellant - loose;
22 - Propellant - bottom bunch;
23, 24 - Series, year of manufacture of cartridge case;
25 - Number of calibration;
26 - Number of melt;
27 - Number of shots;
28 - Symbol of manufacturer;
29 - Symbol of control;
30 - Symbol of inspection;
31 - Fuze,
32 - Explosive charge;
33 - Body of projectile;
34 - Driving band;
35 - Type of explosive;
36 - Type of projectile - “OF”.

FWP Ammunition

ANNEX C-41

FIELD of AMMUNITION	*artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge High Explosive - Fragmentation with Full Charge*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*УОФ-412*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *100 mm tank gun D10-TG or D10-T2S (100TK),* *100 mm field gun M1953 (100K53),* *100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УОФ-412* *УОФ-412Ж*	**abbreviation**	*ОФ-412* *ОФ-412Ж*	**abbreviation**	*УОФ-412* *ПОЛНЫЙ*
length [*mm*]	*1082-1096*	**weight [*kg*]**	*15.60*	**type and size of propellant charge**	*ДГТ-3-18-22,* *НДТ-3-18/1,* *НДТ-3-18/1+* *МК 20/1ОД,*
average weight [*kg*]	*30.00*	**length [*mm*]**	*480-493*		
		type of explosives	*TNT*		
initial velocity of projectile [$m.s^{-1}$]	*896-930*	**weight of bursting charge [*kg*]**	*1.46*	**weight of propellant charge [*kg*]**	*5.30*
maximum range (of fire) [*m*]	*412: 16800-21020* *412Ж:16548-20705*	**type of fuze**	*РГМ, РГМ-6* *В-429*	**length [*mm*]**	*696*
				material of cartridge case	*Ms*
				weight of decoppering agent [*kg*]	*0.060*
				type of primer	*КВ-13, КВ-13У*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*84*

DESCRIPTION

УОФ-412 (412Ж) is used to engage light armoured targets, tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of the body (2), explosive charges (3) and fuze (1).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

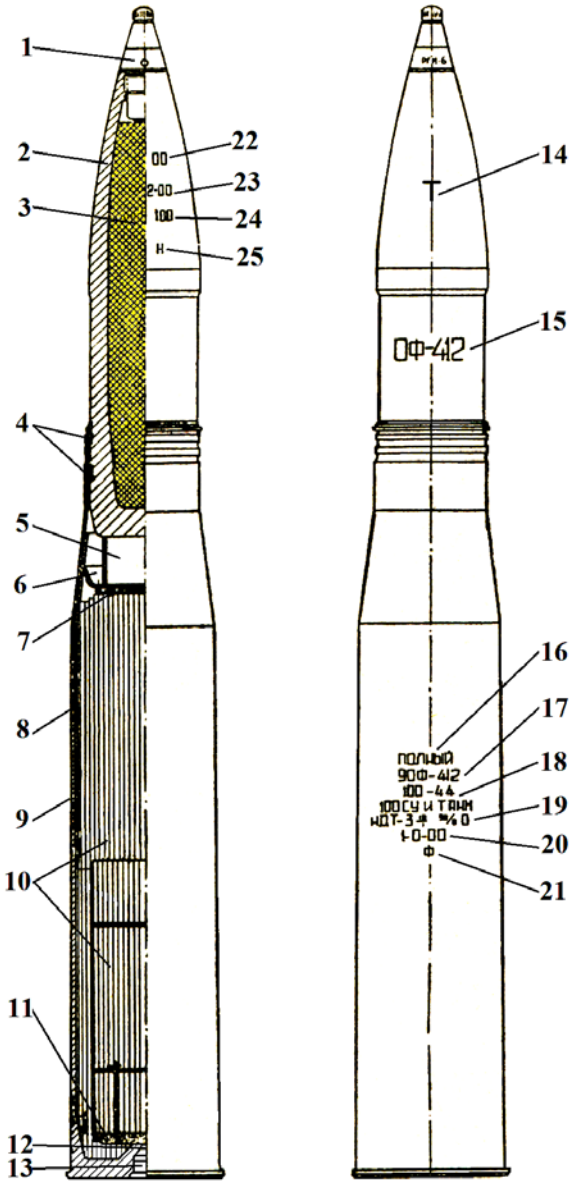
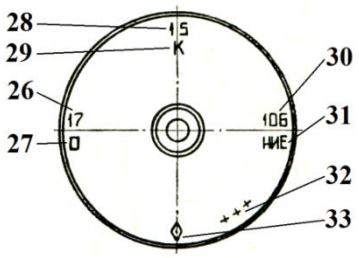
Type	Characteristic
РГМ, РГМ-6, В-429	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. Fuzes have an adjustable delay, secured detonator and provide muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

*Driving band were made from copper or alloy of "FeS". Marking of projectile ОФ-412**Ж** means that the driving band is made of alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band.*

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Fuze;* *2 - Body of projectile;* *3 - Explosive charge;* *4 - Driving bands;* *5 - Support;* *6 - Bottom cover;* *7 - Decoppering agent;* *8 - Flash reducing agent;* *9 - Cartridge case;* *10 - Propellant;* *11 - Igniter;* *12 - Label with propellant data;* *13 - Primer;* *14 - Type of explosive* *15 - Type of shot - „ОФ-412";* *16 - Marking of full charge „ПОЛНЫЙ"* *17 - Marking of cartridge;* *18 - Marking of calibre and weapon;* *19 - Marking of powder (type, shape, dimension) and index of manufacturer;* *20 - Series-year of production and symbol of filling factory;* *21 - Marking of flash reducing agent* *<u>On the other hand projectile</u>:* *22 - "00" - Symbol of filling factory;* *23 - "2-00" - Series-year of production;* *24 - "100" - Calibre;* *25 - "H" - Weight sign;* *26, 27 - Series and year of production of cartridge case;* *28 - Number of melt;* *29 - Marking of material of cartridge case;* *30 - Symbol of manufacturer;* *31 - Symbol of control;* *32 - Number of calibration;* *33 - Symbol of inspection.*
BOTTOM **of the cartridge case**	
	

	FWP Ammunition	ANNEX C-42

FIELD of AMMUNITION	*artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge High Explosive - Fragmentation*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*100-JOF-TK, K53, ShK44 mn*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 100 mm tank gun D10-TG or D10-T2S (100TK), 100 mm field gun M1953 (100K53), 100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*100-JOF-mn-TK, K53, ShK44*	**abbreviation**	*100-OF*	**abbreviation**	*Nkm 100 ShK 44, K 53, TK*
length [*mm*]	*1091-1105*	**weight [*kg*]**	*15.60*	**type and size of propellant charge**	*Dgtp 5x0.9/270-8.5 or Nc7p 8.3x1.7/13-(9/7) + Nctp 7.5x1.8/585-(12/1)*
average weight [*kg*]	*26.70*	**length [*mm*]**	*492-502*	**weight of propellant charge [*kg*]**	*2.45*
		type of explosives	*TNT*		
initial velocity of projectile [$m.s^{-1}$]	*617*	**weight of bursting charge [*kg*]**	*1.46*	**length [*mm*]**	*696*
				material of cartridge case	*Ms (brass) Fe (steel)*
maximum range (of fire) [*m*]	*13810*	**type of fuze**	*nz10bv, nz 11, B-429*	**weight of decoppering agent [*kg*]**	*0.030*
				type of primer	*KV-4, zš-1a*

PACKING			
Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*Ms - 77; Fe - 69*

DESCRIPTION

100-JOF-mn is used to engage light armoured targets, tanks, armoured vehicles, reinforced concrete objects. This projectile consists of the body (32), explosive charge (31), fuze (30) and driving bands (33).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

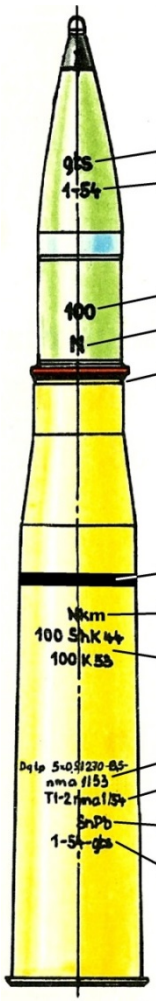
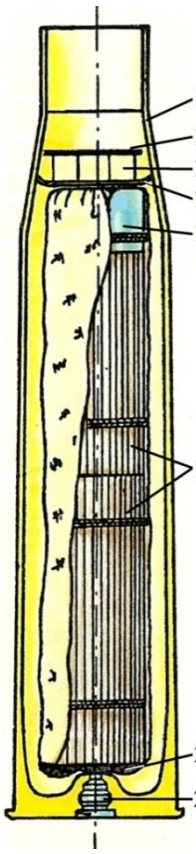
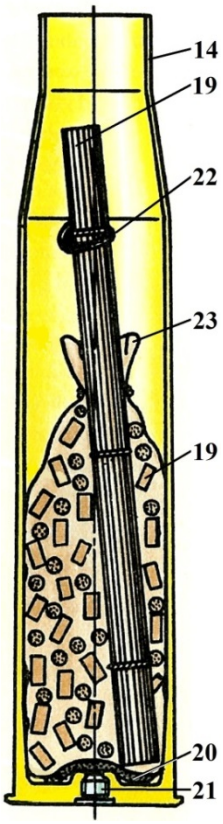
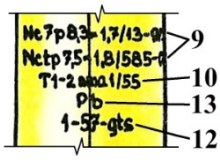
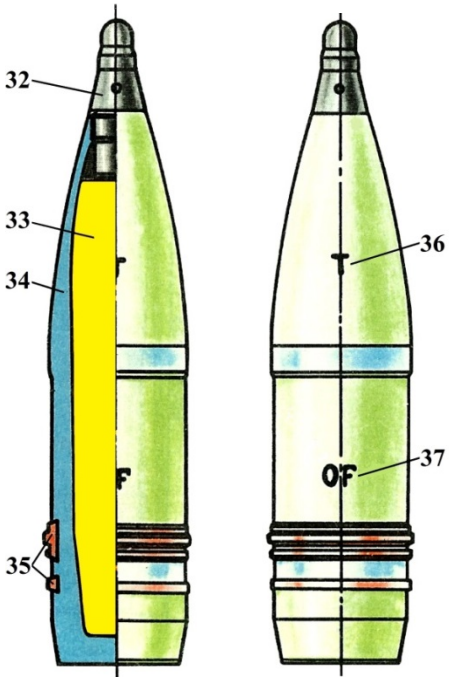
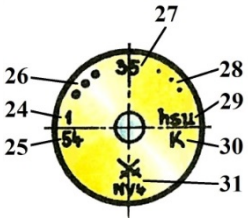
FUZE	
Type	**Characteristic**
nz10bv, nz 11, B-429	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. The fuze has an adjustable delay, secured detonator, and provides muzzle safety. Fuze "nz 11" is used since 1960.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band were made from copper + nickel (upper driving band) and copper (bottom driving band). The cartridge is made of brass or steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
	Propellant: „Dgtp“	**„Nc7p + Nctp“**	
			*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Crimp (cannelluring since 3/55);* *6 - Graphic marking of cartridge;* *7 - Marking of cartridge case assembly;* *8 - Marking of weapon (and “100 TK” since 1959);* *9 - Marking of powder (type, shape, dimension) and manufacturer, series, year of manufacture of powder;* *10 - Type of black powder in igniter and symbol of manufacturer, series, year of manufacture of black powder;* *11 - Marking of decoppering agent;* *12 - Series- year of production and symbol of filling factory;* *13 - Marking of decoppering agent;* *14 - Cartridge case;* *15 - Cardboard disc;* *16 - Triangle of cardboard;* *17 - Cover;* *18 - Decoppering agent;* *19 - Propellant;* *20 - Igniter;* *21 - Primer;* *22 - Decoppering agent;* *23 - Bag for propellant;* *24, 25 - Series, year of manufacture of cartridge case;* *26 - Number of calibration;* *27 - Number of melt;* *28 - Number of shots;* *29 - Symbol of manufacturer;* *30 - Symbol of control;* *31 - Symbol of inspection;* *32 - Fuze,* *33 - Explosive charge;* *34 - Body of projectile;* *35 - Driving bands* *36 - Type of explosive;* *37 - Type of projectile - “OF”.*
or 			
BOTTOM of the cartridge case			
			

FWP Ammunition

ANNEX C-43

FIELD of AMMUNITION	*artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge High Explosive - Fragmentation with Reduced Charge*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*УОФ-412У*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 100 mm tank gun D10-TG or D10-T2S (100TK), 100 mm field gun M1953 (100K53), 100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УОФ-412У УОФ-412УЖ*	**abbreviation**	*ОФ-412 ОФ-412Ж*	**abbreviation**	*УОФ-412У УМЕНЬШЕННЫЙ*
length [*mm*]	*1082-1096*	**weight [*kg*]**	*15.60*	**type and size of propellant charge**	*9/7+12/1ТР, 8/7ОД+12/1ТР, 9/7ОД+12/1ТР, 9/7*
average weight [*kg*]	*27.00*	**length [*mm*]**	*480-493*		
		type of explosives	*TNT*		
initial velocity of projectile [$m.s^{-1}$]	*596-617*	**weight of bursting charge [*kg*]**	*1.46*	**weight of propellant charge [*kg*]**	*2.40*
maximum range (of fire) [*m*]	*У: 11000-13810 УЖ:10835-13600*	**type of fuze**	*РГМ, РГМ-6 В-429*	**length [*mm*]**	*696*
				material of cartridge case	*Ms*
				weight of decoppering agent [*kg*]	*0.060*
				type of primer	*КВ-4, КВ-13*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*84*

DESCRIPTION

УОФ-412У (412УЖ) is used to engage light armoured targets, tanks, armoured vehicles, reinforced concrete objects. This projectile consists of the body (2), explosive charges (3) and fuze (1).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

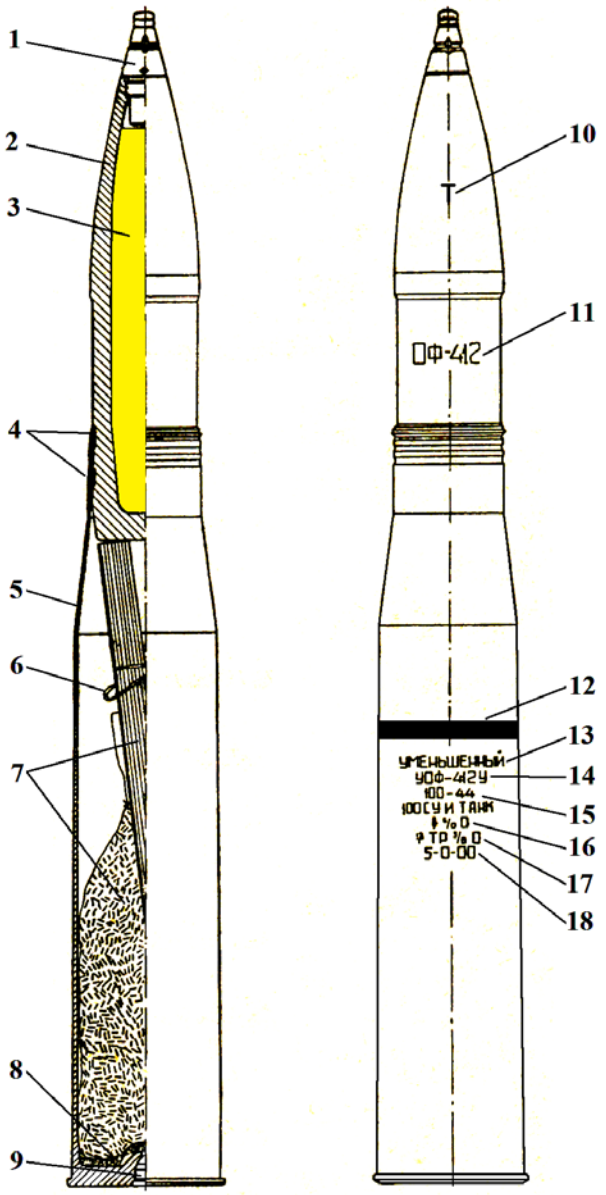
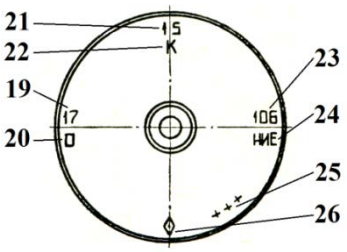
Type	Characteristic
РГМ, РГМ-6, В-429	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. The fuze has an adjustable delay, secured detonator, and provides muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band were made from copper or alloy of "FeS". Marking of projectile ОФ-412Ж means that the driving band made of an alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Fuze;* *2 - Body of projectile;* *3 - Explosive charge;* *4 - Driving bands;* *5 - Cartridge case;* *6 - Decoppering agent;* *7 - Propellant;* *8 - Igniter;* *9 - Primer;* *10 - Type of explosive* *11 - Type of shot - „ОФ-412";* *12 - Graphic marking of cartridge - black stripe;* *13 - Marking of reduced charge „УМЕНЬШЕННЫЙ"* *14 - Marking of cartridge;* *15 - Marking of calibre and weapon;* *16, 17 - Marking of powder (type, shape, dimension) and index of manufacturer;* *18 - Series-year of production and symbol of filling factory* *<u>On the other hand projectile</u>:* *"00" - Symbol of filling factory;* *"2-00" - Series-year of production;* *"100" - Calibre;* *"H" - Weight sign* *19, 20 - Series and year of production of cartridge case;* *21 - Number of melt;* *22 - Marking of material of cartridge case;* *23 - Symbol of manufacturer;* *24 - Symbol of control;* *25 - Number of calibration;* *26 - Symbol of inspection*
BOTTOM **of the cartridge case**	
	

	FWP Ammunition	**ANNEX C-44**

FIELD of AMMUNITION	*Artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge Armour Piercing Sharp Tip with Tracer*
TYPE	*APST-T*
NAME/ASSIGNED MARK (original)	*УБР-412*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *100 mm tank gun D10-TG or D10-T2S (100TK),* *100 mm field gun M1953 (100K53),* *100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УБР-412*	**abbreviation**	*БР-412*	**abbreviation**	*УБР-412Б*
length [*mm*]	*928-933*	**weight [*kg*]**	*15.88*	**type and size of propellant charge**	*ДГ-3-18, ДТ-3-18/1+МК 20/1ОД, ДГТ-3-18/1, НДТ-3-18/1*
average weight [*kg*]	*30.00*	**length [*mm*]**	*306*		
		type of explosives	*A-IX-2*		
initial velocity of projectile [$m.s^{-1}$]	*895-925*	**weight of bursting charge [*kg*]**	*0.065*	**weight of propellant charge [*kg*]**	*5.50*
maximum range (of fire) [*m*]	*4000*	**type of fuze**	*МД-8*	**length [*mm*]**	*696*
				material of cartridge case	*Ms*
				weight of decoppering agent [*kg*]	*0.060*
				type of primer	*КВ-13, КВ-13У*

PACKING			
Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*84*

DESCRIPTION

УБР-412Б is used to engage tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of the windshield (1), body of projectile (2), explosive charge (3), driving bands (4) and the fuze (5) is located at the rear with a tracer.

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

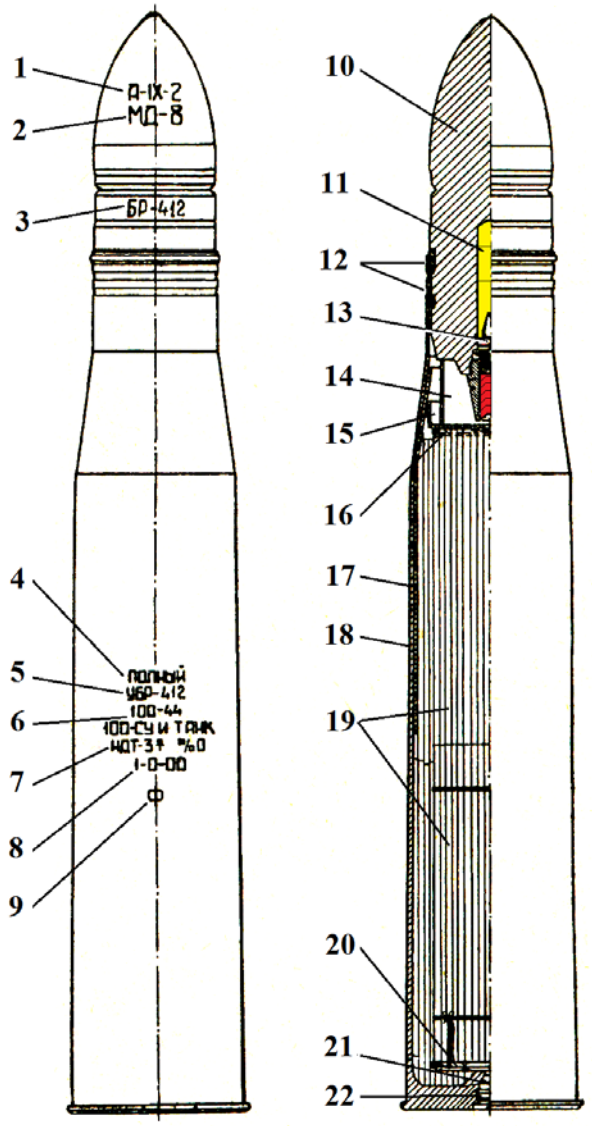
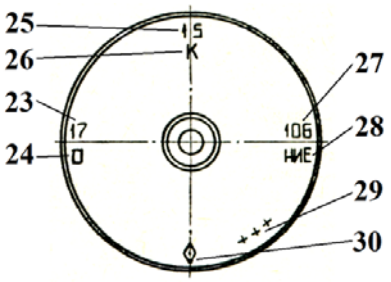
FUZE	
Type	**Characteristic**
МД-8	*The fuze is inserted into the bottom of shot and is armed by the inertial forces in the travel of the shot to the target.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Body is made from hardened steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Type of explosives;* *2 - Type of fuze;* *3 - Type of shot - „БР-412";* *4 - Marking of full cartridge „ПОЛНЫЙ"* *5 - Marking of cartridge;* *6 - Marking of calibre and weapon;* *7 - Marking of powder (type, shape, dimension) and index of manufacturer;* *8 - Series-year of production and symbol of filling factory;* *9 - Marking of flash reducing agent* *10 - Body of projectile;* *11 - Explosive charge;* *12 - Driving bands;* *13 - Fuze with tracer;* *14 - Support;* *15 - Bottom cover;* *16 - Decoppering agent;* *17 - Flash reducing agent;* *18 - Cartridge case;* *19 - Propellant;* *20 - Igniter;* *21 - Label with propellant data;* *22 - Primer;* *<u>On the other hand projectile</u>:* *"00" - Symbol of filling factory;* *"1-45" - Series-year of production;* *"100" - Calibre;* *"H" - Weight sign;* *23, 24 - Series and year of production of cartridge case;* *25 - Number of melt;* *26 - Marking of material of cartridge case;* *27 - Symbol of manufacturer;* *28 - Symbol of control;* *29 - Number of calibration;* *30 - Symbol of inspection.*
BOTTOM **of the cartridge case**	
	

	FWP Ammunition	ANNEX C-45

FIELD of AMMUNITION	*artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge Armour Piercing with Blunt Tip with Tracer*
TYPE	*APBT-T*
NAME/ASSIGNED MARK (original)	*УБР-412Б*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *100 mm tank gun D10-TG or D10-T2S (100TK),* *100 mm field gun M1953 (100K53),* *100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УБР-412Б*	**abbreviation**	*БР-412Б*	**abbreviation**	*УБР-412Б*
length [*mm*]	*928-933*	**weight [*kg*]**	*15.88*	**type and size of propellant charge**	*ДГ-3-18, ДТ-3-18/1+ МК 20/1ОД, ДГТ-3-18/1, НДТ-3-18/1*
average weight [*kg*]	*30.10*	**length [*mm*]**	*382-392*		
		type of explosives	*A-IX-2*		
initial velocity of projectile [$m.s^{-1}$]	*895-925*	**weight of bursting charge [*kg*]**	*0.065*	**weight of propellant charge [*kg*]**	*5.50*
maximum range (of fire) [*m*]	*4000*	**type of fuze**	*МД-8 ДБР-2*	**length [*mm*]**	*696*
				material of cartridge case	*Ms*
				weight of decoppering agent [*kg*]	*0.060*
				type of primer	*КВ-13, КВ-13У*

PACKING			
Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*85*

DESCRIPTION

УБР-412Б is used to engage tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of windshield (1), body of projectile (2), explosive charge (3), driving bands (4) and the fuze (5) is located at the rear with a tracer.

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

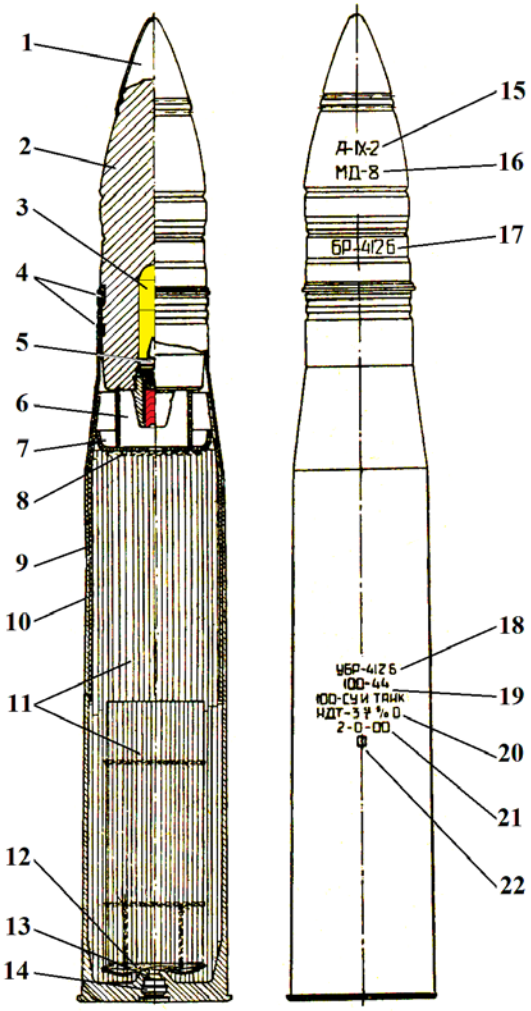
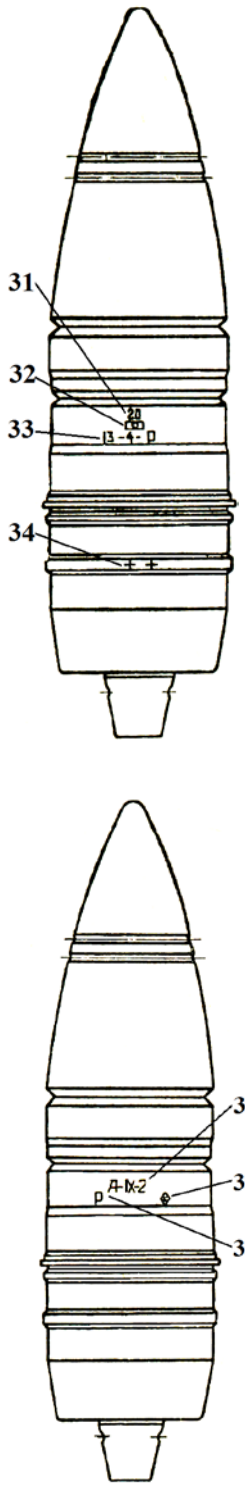
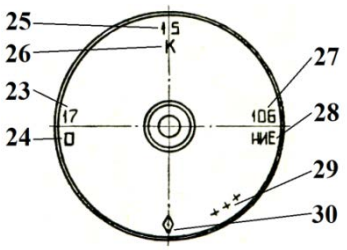
Type	Characteristic
МД-8 or ДБР-2	*The fuze is inserted into the bottom of shot and is armed by the inertial forces in the travel of the shot to the target.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Body is made from hardened steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
		*1 - Windshield;* *2 - Body of projectile;* *3 - Explosive charge;* *4 - Driving bands;* *5 - Fuze with tracer;* *6 - Support;* *7 - Bottom cover;* *8 - Decoppering agent;* *9 - Flash reducing agent;* *10 - Cartridge case;* *11 - Propellant;* *12 - Igniter;* *13 - Label with propellant data;* *14 - Primer;* *15 - Type of explosives;* *16 - Type of fuze;* *17 - Type of projectile - “БР-412Б”;* *<u>On the other hand projectile</u>:* *“00” - Symbol of filling factory;* *“1-45” - Series-year of production;* *“100” - Calibre;* *“+ +” - Weight sign;* *18 - Marking of cartridge;* *19 - Marking of calibre and weapon;* *20 - Marking of powder (type, shape, dimension) and index of manufacturer;* *21 - Series-year of production and symbol of filling factory;* *22 - Marking of flash reducing agent* *23, 24 - Series and year of production of cartridge case;* *25 - Number of melt;* *26 - Marking of material of cartridge case;* *27 - Symbol of manufacturer;* *28 - Symbol of control;* *29 - Number of calibration;* *30 - Symbol of inspection* *31 - Number of melt;* *32 - Sign for testing the hardness;* *33 - Marking of manufacturer of body and series and year of production of body;* *34 - Weight sign;* *35 - Type of explosives;* *36 - Symbol of inspection;* *37 - Symbol of control.*
BOTTOM **of the cartridge case**		
		

	FWP Ammunition	**ANNEX C-46**

FIELD of AMMUNITION	*artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge Armour Piercing with Tracer*
TYPE	*AP-T*
NAME/ASSIGNED MARK (original)	*УБР-412Д*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *100 mm tank gun D10-TG or D10-T2S (100TK),* *100 mm field gun M1953 (100K53),* *100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УБР-412Д*	**abbreviation**	*БР-412Д*	**abbreviation**	*УБР-412Д*
length [*mm*]		**weight [*kg*]**	*15.88*	**type and size of propellant charge**	*ДГ-3-18, ДТ-3-18/1+ МК 20/1ОД, ДГТ-3-18/1*
average weight [*kg*]	*30.40*	**length [*mm*]**	*390*		
		type of explosives	*A-IX-2*		
initial velocity of projectile [$m.s^{-1}$]	*887-916*	**weight of bursting charge [*kg*]**	*0.061*	**weight of propellant charge [*kg*]**	*5.50*
maximum range (of fire) [*m*]	*4000*	**type of fuze**	*МД-8 ДБР-2*	**length [*mm*]**	*696*
				material of cartridge case	*Ms*
				weight of decoppering agent [*kg*]	*0.060*
				type of primer	*КВ-13, КВ-13У*

PACKING			
Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*85*

DESCRIPTION

УБР-412Д is used to engage tanks, armoured vehicles, and reinforced concrete objects. This shell consists of the windshield (1), Makarovov´s cap (2), body of projectile (3), explosive charge (4), driving bands (5) and fuze (6) with tracer.

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

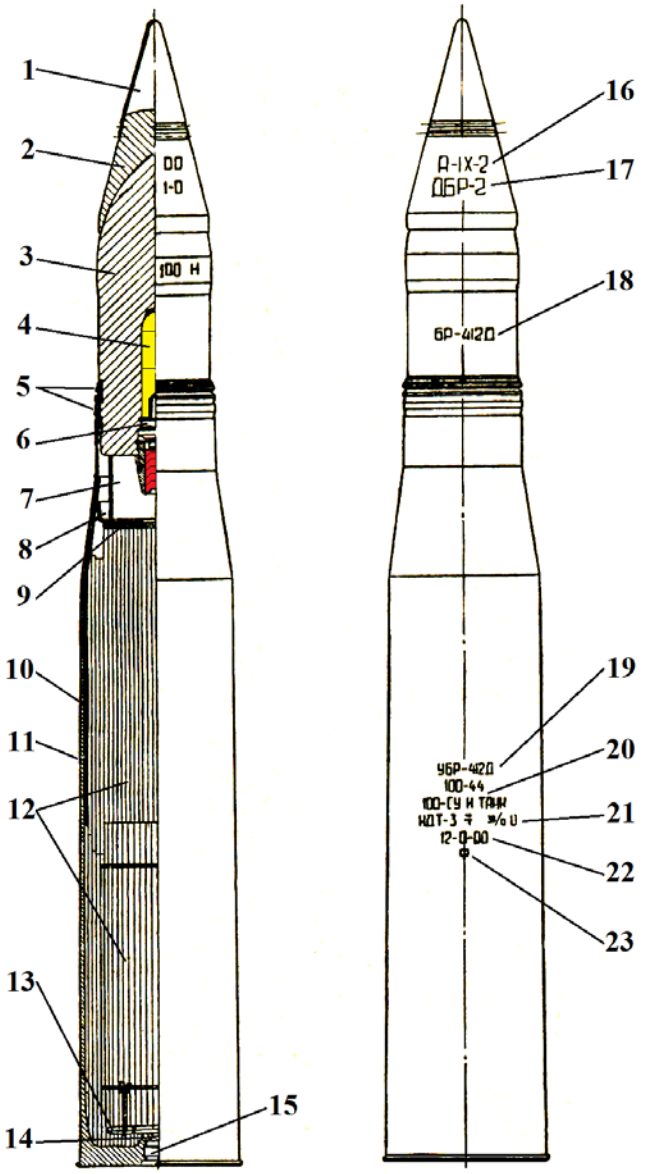
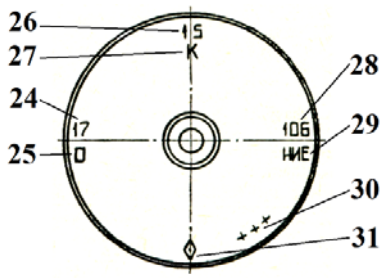
Type	Characteristic
МД-8 or ДБР-2	*The fuze is inserted into the bottom of shot and is armed by the inertial forces in the travel of the shot to the target.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded shot.

NOTICE

Body is made from hardened steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Windshield;* *2 - Makarov´s cap;* *3 - Body of projectile;* *4 - Explosive charge;* *5 - Driving bands;* *6 - Fuze with tracer;* *7 - Support;* *8 - Bottom cover;* *9 - Decoppering agent;* *10 - Flash reducing agent;* *11 - Cartridge case;* *12 - Propellant;* *13 - Igniter;* *14 - Label with propellant data;* *15 - Primer;* *16 - Type of explosives;* *17 - Type of fuze;* *18 - Type of projectile - “БР-412Д”;* *<u>On the other hand projectile</u>:* *“00” - Symbol of filling factory;* *“1-45” - Series-year of production;* *“100” - Calibre;* *“H” - Weight sign;* *19 - Marking of cartridge;* *20 - Marking of calibre and weapon;* *21 - Marking of powder (type, shape, dimension) and index of manufacturer;* *22 - Series-year of production and symbol of filling factory;* *23 - Marking of flash reducing agent* *24, 25 - Series and year of production of cartridge case;* *26 - Number of melt;* *27 - Marking of material of cartridge case;* *28 - Symbol of manufacturer;* *29 - Symbol of control;* *30 - Number of calibration;* *31 - Symbol of inspection.*
BOTTOM **of the cartridge case**	
	

	FWP Ammunition	ANNEX C-47

FIELD of AMMUNITION	*artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge Armour Piercing with Tracer*
TYPE	*AP-T*
NAME/ASSIGNED MARK (original)	*100-JPSv-TK, K53, ShK44*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 100 mm tank gun D10-TG or D10-T2S (100TK), 100 mm field gun M1953 (100K53), 100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE	
abbreviation	*100-JPSv-100TK, 100K53, 100ShK44*
length [*mm*]	*1000-1007*
average weight [*kg*	*Ms - 29.54 Fe - 26.80 /cartridge case type/*
initial projectile velocity [$m.s^{-1}$]	*955*
maximum range (of fire) [*m*]	*4000*

PROJECTILE	
abbreviation	*100-PSv*
length [*mm*]	*352-356*
weight [*kg*]	*14.74*
type of explosives	*A-IX-2 or H10*
weight of bursting charge [*kg*]	*A-IX-2 - 0.052 H10 - 0.054*
type of fuze	*PD-30, dz 30*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Nk 100 ShK 44, K 53, TK*
length [*mm*]	*696*
type and size of propellant charge	*Dgtp 6x1.8/360-8.5 + Dgtp 7.5x2/360+180-8.5 or Dgtp 5.6x1.85/260-8.15 or Ngtp 5.6x1.78/260-7.85-(NDT-3)*
weight of propellant charge [*kg*]	*5.65 or 5.7 or 5.8*
material of cartridge case	*Ms (brass) Fe (steel)*
weight of decoppering agent [*kg*]	*0.060*
primer type	*KV-4, KV-13, zš-1a*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*Ms - 82; Fe - 77*

DESCRIPTION

100-JPSv is used to engage tanks, armoured vehicles, reinforced concrete objects. This projectile consists of the body (35), windshield (33) and Makarov's cap (34), explosive charges (36) and fuze (38) with tracer.

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
PD-30, dz 30	*The fuze is inserted into the bottom of shot and is armed by inertial forces in the travel of the shot to the target*

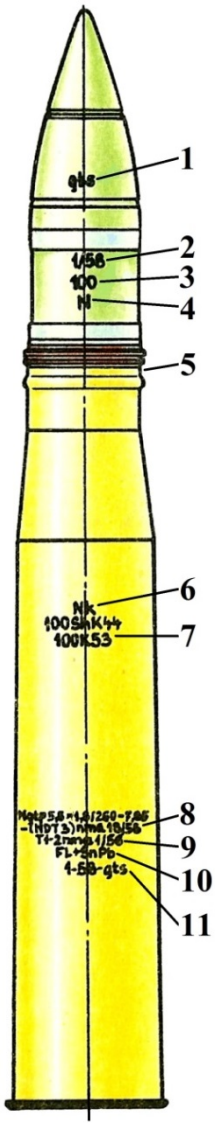
SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

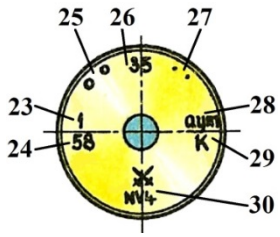
NOTICE

Body is made from hardened steel. Driving band was made from copper + nickel (upper driving band) and copper (bottom driving band). The cartridge is made of brass or steel.

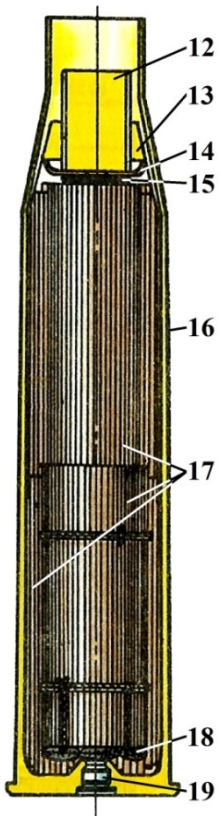
DRAWINGS/CUTAWAY/MARKING/STENCILING



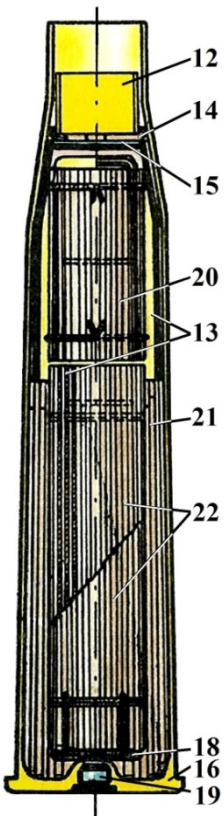
BOTTOM of the cartridge case

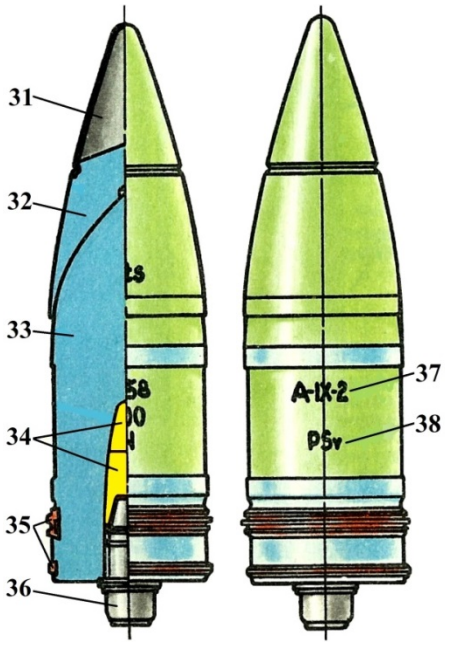


Propellant: „Ngtp“



„Dgtp“





LEGEND

1 - Symbol of filling factory;
2 - Series and year of production of projectile;
3 - Calibre;
4 - Weight sign;
5 - Crimp
6 - Marking of cartridge case assembly;
7 - Marking of weapon (and “100 TK” since 1959);
8 - Marking of powder (type, shape, dimension) and Manufacturer, series, year of manufacture of powder;
9 - Type of black powder in igniter and symbol of manufacturer, series, year of manufacture of black powder;
10 - Flash reducing agent + type of decoppering agent;
11 - Series- year of production and symbol of filling factory;
12 – Expansion tube - spacer;
13 - Flash reducing agent;
14 - Cover;
15 - Decoppering agent;
16 - Cartridge case;
17 - Propellant;
18 - Igniter;
19 - Primer;
20 - Propellant - upper bunch;
21 - Propellant - loose;
22 - Propellant - bottom bunch;
23, 24 - Series, year of manufacture of cartridge case;
25 - Number of calibration;
26 - Number of melt;
27 - Number of shots;
28 - Symbol of manufacturer;
29 - Symbol of control;
30 - Symbol of inspection;
31 - Windshield;
32 - Makarov’s cap;
33 - Body of projectile;
34 - Explosive charges;
35 - Driving bands;
36 - Fuze with Tracer
37 - Type of explosive;
38 - Type of projectile - “PSv”.

	FWP Ammunition	**ANNEX C-48**

FIELD of AMMUNITION	*artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge Armour Piercing with Tracer - Practice*
TYPE	*AP-T - Practice*
NAME/ASSIGNED MARK (original)	*УПБР-412*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *100 mm tank gun D10-TG or D10-T2S (100TK),* *100 mm field gun M1953 (100K53),* *100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УПБР-412*	**abbreviation**	*ПБР-412*	**abbreviation**	*УПБР-412*
length [*mm*]		**weight [*kg*]**	*15.88*	**type and size of propellant charge**	*ДГ-3-18, ДТ-3-18/1+ МК 20/1ОД, ДГТ-3-18/1, НДТ-3-18/1*
average weight [*kg*]	*30.00*	**length [*mm*]**	*360*		
		type of explosives	---		
initial velocity of projectile [$m.s^{-1}$]	*895-925*			**weight of propellant charge [*kg*]**	*5.50*
				length [*mm*]	*696*
maximum range (of fire) [*m*]	*3000*			**material of cartridge case**	*Ms*
				weight of decoppering agent [*kg*]	*0.060*
				type of primer	*KB-13, KB-13У*

PACKING			
Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*85*

DESCRIPTION

УПБР-412 is used for training and testing the engaging of tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a windshield (1), body of projectile (2), driving bands (3) and at the rear is located tracer (4). Body is made from hardened steel.

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
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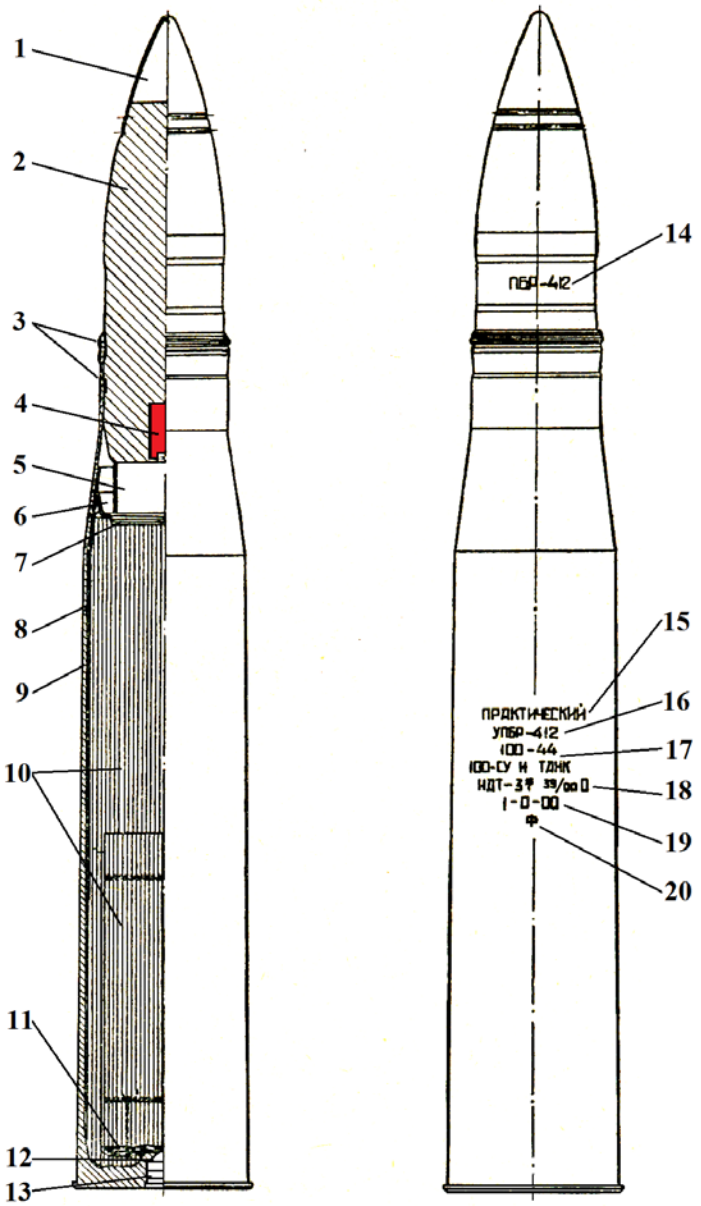
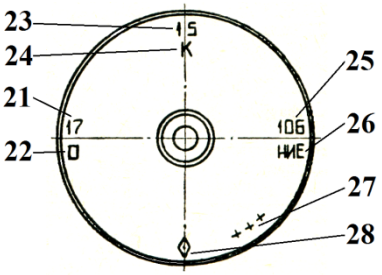
SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Windshield;* *2 - Body of projectile;* *3 - Driving bands;* *4 - Tracer;* *5 - Support;* *6 - Bottom cover;* *7 - Decoppering agent;* *8 - Flash reducing agent;* *9 - Cartridge case;* *10 - Propellant;* *11 - Igniter;* *12 - Label with propellant data;* *13 - Primer;* *14 - Type of shot - " ПБР-412";* *<u>On the other hand projectile</u>:* *"00" - Symbol of filling factory;* *"1-45" - Series-year of production;* *"100" - Calibre;* *"H" - Weight sign;* *15 - Marking of cartridge „ПРАКТИЧЕСКИЙ"* *16 - Type of cartridge;* *17 - Marking of calibre and weapon;* *18 - Marking of powder (type, shape, dimension) and index of manufacturer;* *19 - Series-year of production and symbol of filling factory;* *20 - Marking of flash reducing agent* *21,22 - Series and year of production of cartridge case;* *23 - Number of melt;* *24 - Marking of material of cartridge case;* *25 - Symbol of manufacturer;* *26 - Symbol of control;* *27 - Number of calibration;* *28 - Symbol of inspection.*
BOTTOM **of the cartridge case**	
	

	FWP Ammunition	**ANNEX C-49**

FIELD of AMMUNITION	*artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge High Explosive Anti-Tank*
TYPE	*HEAT*
NAME/ASSIGNED MARK (original)	*100-JPrSv- TK, K53, ShK44*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *100 mm tank gun D10-TG or D10-T2S (100TK),* *100 mm field gun M1953 (100K53),* *100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*100-JPrSv-K53*	**abbreviation**	*100-PrSv*	**abbreviation**	*Nk* *100 ShK 44, K 53, TK*
length [*mm*]	*1089 - 1095*	**length [*mm*]**	*650*	**type and size of propellant charge**	*Dgtp 5x1.5/250+170-8.15* *or Ngtp 6.5x1.8/420-6.95*
weight [*kg*]	*21.50*	**weight [*kg*]**	*9.55*		
initial velocity of projectile [$m.s^{-1}$]	*995*	**type of explosives**	*T/H* *60/40*	**weight of propellant charge [*kg*]**	*Dgtp - 4.50* *Ngtp - 4.85*
		weight of blasting filler [*kg*]	*0.961*		
maximum range (of fire) [*m*]	*2500*	**type of fuze**	*nz 42* *or nz 42a with rp-nz 42*	**material of cartridge case**	*Fe*
				type of primer	*KV-4, zš-1a*

PACKING			
Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*59*

DESCRIPTION

100-JPrSv-K53 is used to engage tanks, armoured vehicles, self-propelled guns and against buildings and shelters. This projectile consists of a fuze (1+30), cap (25), body (26), cumulative insert (28), hollow charge (27), and stabilizer (34) with stabilizer fins (35) and tracer (37).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
nz 42, nz 42a	*Fuze - head, instantaneous, superquick with masking safety.*

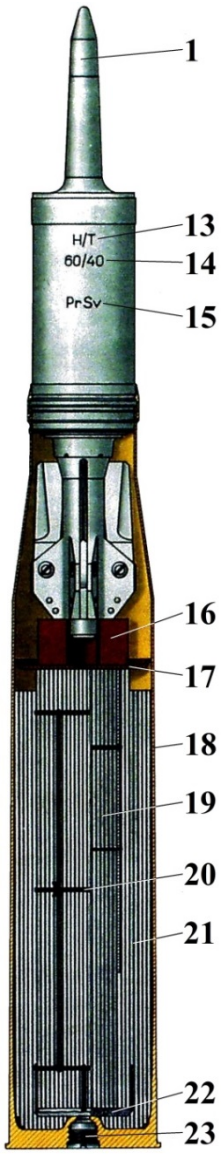
SAFETY CONSIDERATION THREAT

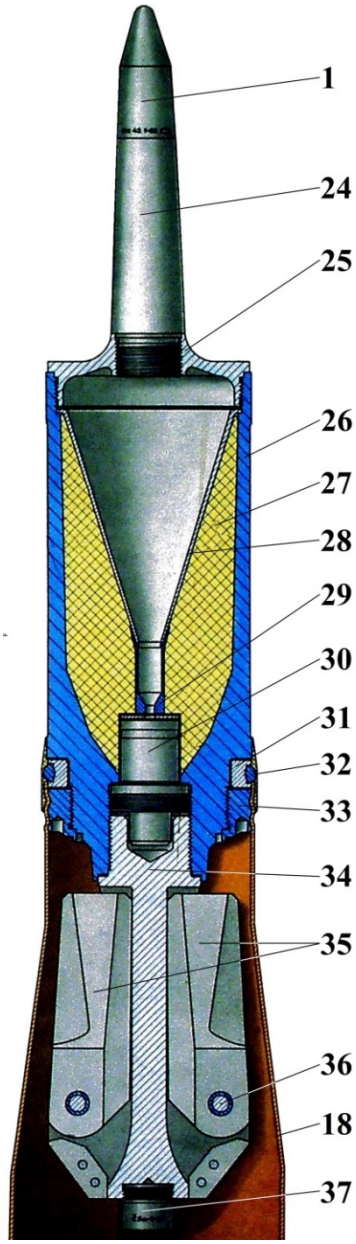
Do not touch and do not move unexploded projectile.

NOTICE

The cartridge case is made of steel - surface protection zinc.
Fuze "nz 42" or "nz 42a" is nose impact component of the fuze system and "rp-nz 42" is detonator safety part of fuze at the rear.

DRAWINGS/CUTAWAY/MARKING/STENCILING:





PROJECTILE IN FLIGHT

LEGEND

1 - Fuze;
2 - Symbol of filling factory;
3 - Series/year of projectile production;
4 - Calibre;
5 - Weight sign;
6 - Crimp;
7 - Marking of cartridge case assembly;
8 - Marking of weapons;
9 - Marking of powder (type, shape, dimension) and symbol of manufacturer, series/year of production;
10 - Type of black powder in igniter, symbol of manufacturer, series/year of production;
11 - Marking of flash reducing agent;
12 - Series-year of production and symbol of filling factory;
13 - Type of explosives;
14 - The ratio of explosives content;
16 – Expansion tube - spacer;
17 - Cover;
18 - Cartridge case;
19 - Propellant - bunch;
20 - Silk cord;
21 - Propellant - loose;
22 - Igniter;
23 - Primer;
24 - Extension;
25 - Cap;
26 - Body of projectile;
27 - Explosive charge;
28 - Shaped charge liner (cumulative insert);
29 - Fire tube;
30 - Detonator safety part of fuze;
31 - Rotating ring;
32 - Driving band;
33 - Nut;
34 - Stabilizer;
35 – Fins/stabilizer;
36 - Pin;
37 – Tracer.

	FWP Ammunition	ANNEX C-50

FIELD of AMMUNITION	*artillery*
CALIBER	*100 mm*
NAME	*100 mm Fixed Cartridge High Explosive - Fragmentation Practice with Reduced Charge*
TYPE	*HE-FRAG Practice*
NAME/ASSIGNED MARK (original)	*100-JOFNh-TK, K53, ShK44 mn*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 100 mm tank gun D10-TG or D10-T2S (100TK), 100 mm field gun M1953 (100K53), 100 mm self-propelled gun M1944 (100SpG44)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*100-JOFNh-TK, K53, ShK44 mn*	**abbreviation**	*100-OFNh*	**abbreviation**	*Nkm 100 ShK 44, K 53, TK*
length [*mm*]	*1091-1105*	**weight [*kg*]**	*15.60*	**type and size of propellant charge**	*Dgtp 5x0.9/270-8.5*
average weight [*kg*]	*26.80*	**length [*mm*]**	*492-502*	**weight of propellant charge [*kg*]**	*2.50*
		type of explosives	*Inert material*		
initial velocity of projectile [$m.s^{-1}$]	*600*	**weight of bursting charge [*kg*]**	*1.46*	**length [*mm*]**	*696*
				material of cartridge case	*Ms (brass) Fe (steel)*
maximum range (of fire) [*m*]	*11000*	**type of fuze**	*nz10bvNh, nz 11Nh*	**weight of decoppering agent [*kg*]**	*0.030*
				type of primer	*KV-4*

PACKING			
Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*Ms - 77; Fe - 69*

DESCRIPTION

100-JOF-TK, K53, ShK44 mn is for training and testing the engagement of light armoured targets, tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a body (17), inert material (16) and fuze - dummy without explosives (15).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

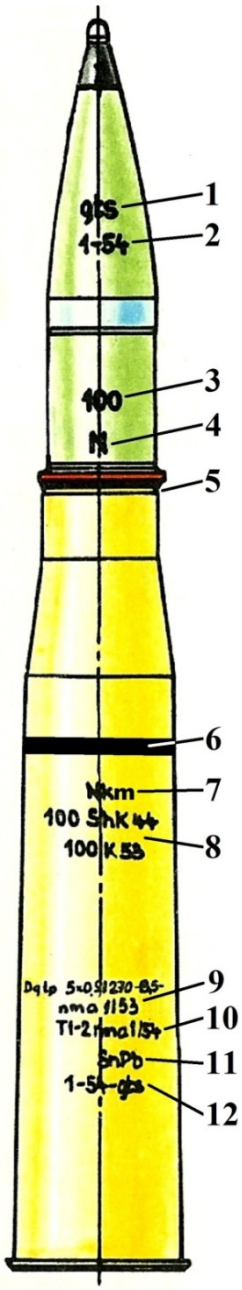
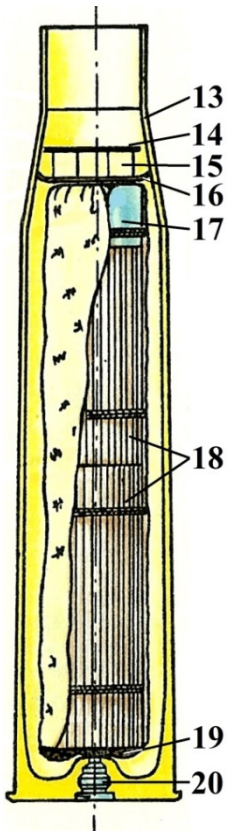
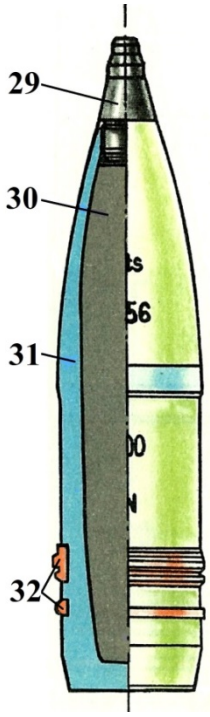
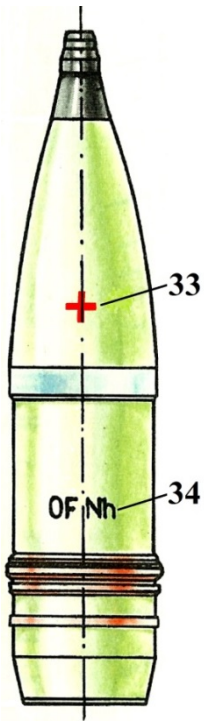
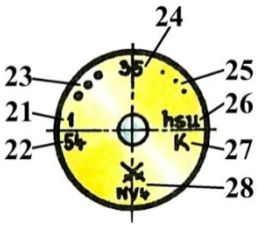
FUZE	
Type	**Characteristic**
nz 10bvNh, nz 11Nh - dummy	*Fuze - dummy without explosive.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Driving band is made from copper+ nickel (upper driving band) and copper (bottom driving band). The cartridge is made of brass or steel. Marking of bottom shell - red cross and cross of dimples.

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
			*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Crimp (Strangulation since 3/55);* *6 - Graphic marking of cartridge;* *7 - Marking of cartridge case assembly;* *8 - Marking of weapon (and "100 TK" since 1959);* *9 - Marking of powder (type, shape, dimension) and manufacturer, series, year of manufacture of powder;* *10 - Type of black powder in igniter and symbol of manufacturer, series, year of manufacture of black powder;* *11 - Marking of decoppering agent;* *12 - Series- year of production and symbol of filling factory;* *13 - Cartridge case;* *14 - Cardboard disc;* *15 – Triangular cardboard spacer;* *16 - Cover;* *17 - Decoppering agent;* *18 - Propellant;* *19 - Igniter;* *20 - Primer;* *21, 22 - Series, year of manufacture of cartridge case;* *23 - Number of calibration;* *24 - Number of melt;* *25 - Number of shots;* *26 - Symbol of manufacturer;* *27 - Symbol of control;* *28 - Symbol of inspection;* *29 - Fuze - dummy;* *30 - Inert material;* *31 - Body of projectile;* *32 - Driving bands* *33 - Red cross - marking of type projectile;* *34 - Type of projectile - "OFNh".*
BOTTOM **of the cartridge case**	**BOTTOM** **of projectile**		
			

	FWP Ammunition	ANNEX C-51

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge High Explosive - Fragmentation*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*122-EOF-H 38*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *122 mm howitzer M1938 (122H38 or M-30),* *122 mm howitzer M1938/74 (122H38/74 or M-30)* *122 mm self-propelled howitzer SU-122 (SU-122)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*122-EOF-H 38*	**abbreviation**	*OF-122 H 38*	**abbreviation**	*Nk 122 H 38*
length [*mm*]		**weight [*kg*]**	*21.76*	**type and size of propellant charge**	*Nctp 2.4x0.9/8-(4/1)+ Nc7p 8.3x1.7/13-(9/7)*
average weight [*kg*]		**length [*mm*]**	*564-573*		
		type of explosives	*TNT*	**weight of propellant charge [*kg*]**	*2.05*
initial velocity of projectile [$m.s^{-1}$]	*full charge - 515* *charge 8 - 205*	**weight of blasting filler [*kg*]**	*3.65*	**length [*mm*]**	*285*
				material of cartridge case	*Ms, Fe*
maximum range (of fire) [*m*]	*full charge - 11800* *charge 8 - 3810*	**type of fuze**	*nz 10bv, nz 11, nz 11M, RGM-2, V-90*	**weight of cartridge case [*kg*]**	*Ms - 3.20* *Fe - 2.90*
				type of primer	*KV-4*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*Ms - 72; Fe - 68*

DESCRIPTION

122-EOF-H 38 is used to engage light armoured targets, tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a body (20), explosive charge (21) and fuze (19).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

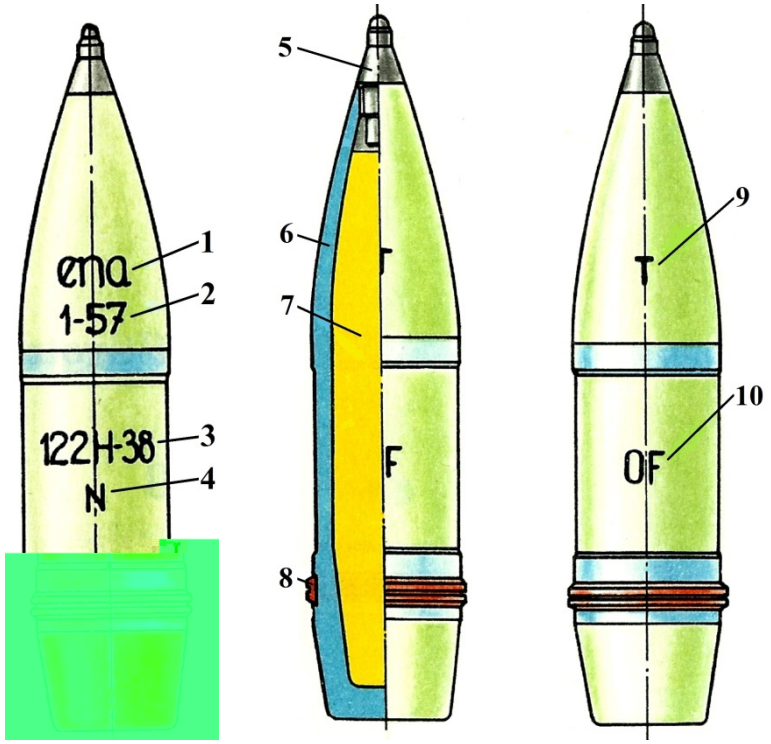
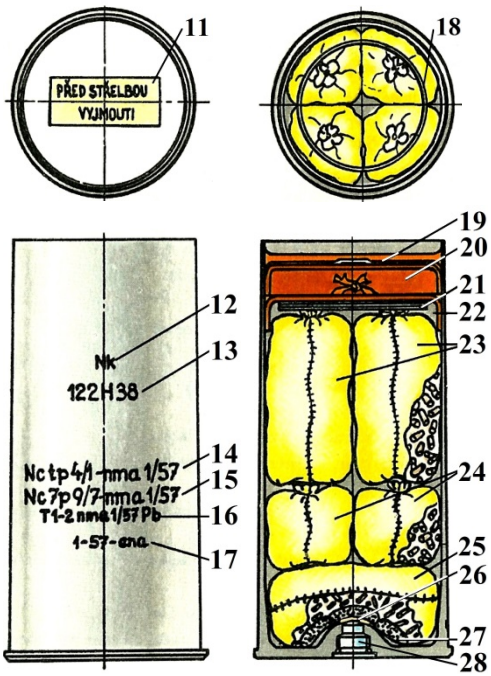
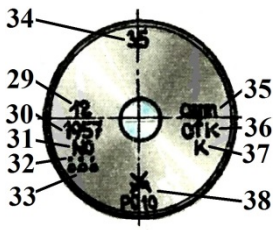
Type	Characteristic
nz 10bv, nz 11, nz 11M, RGM-2, V-90	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. The fuze has an adjustable delay, secured detonator, and provides muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band is made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. The cartridge case is made of brass or steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre and type of weapon;* *4 - Weight sign;* *5 - Fuze;* *6 - Body of projectile;* *7 - Explosive charge;* *8 - Driving band;* *9 - Type of explosive;* *10 - Type of projectile - "OF"* *11 - The label with the inscription "Before shooting remove";* *12 - Marking of cartridge case assembly;* *13 - Marking of calibre and weapon;* *14, 15 - Marking of powder (type, shape, dimension) and Manufacturer, series/ year of manufacture of powder;* *16 - Type of black powder in igniter and symbol of manufacturer, series/ year of manufacture of black powder and type of decoppering agent;* *17 - Series-year of production and symbol of filling factory;* *18 - Decoppering agent;* *19 - Seal of cartridge case;* *20 - Upper cover - reinforced;* *21 - Decoppering agent;* *22 - Lower cover - normal;* *23 - Upper charges (four components) of powder "Nc7p";* *24 - Lower charges (four components) of powder "Nc7p";* *25 - Basic charge of powder "Nc7p";* *26 – Paper label with the propellant dates;* *27 - Igniter;* *28 - Primer;* *29, 30 - Series, year of manufacture of cartridge case;* *31 - Mark of low thermal heating;* *32 - Number of shots;* *33 - Number of calibration;* *34 - Number of melt;* *35 - Symbol of manufacturer;* *36 - Symbol of manufacturer's control;* *37 - Symbol of production control;* *38 - Symbol of inspection.*
	
BOTTOM of cartridge case 	

FWP Ammunition

ANNEX C-52

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge Armour Piercing with Tracer*
TYPE	*AP-T*
NAME/ASSIGNED MARK (original)	*ВБП-463*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *122 mm howitzer M1938 (122H38 or M-30),* *122 mm howitzer M1938/74 (122H38/74 or M-30)* *122 mm self-propelled howitzer SU-122 (SU-122)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*ВБП-463*	**abbreviation**	*БП-463*	**abbreviation**	*Ж11, Ж11А, Ж-463М, Ж-463МЖ*
length [*mm*]		**weight [*kg*]**	*14.83*	**type and size of propellant charge**	*4/1+9/7*
average weight [*kg*]		**length [*mm*]**	*472*		
		type of explosives	*A-IX-1*	**weight of propellant charge [*kg*]**	*2.00*
initial velocity of projectile [$m.s^{-1}$]	*full charge - 570*	**weight of blasting filler [*kg*]**	*0.85*	**length [*mm*]**	*285*
				material of cartridge case	*Ms, Fe*
maximum range (of fire) [*m*]	*4000*	**type of fuze**	*ГКВ*	**weight of cartridge case [*kg*]**	*Ms - 3.20* *Fe - 2.90*
				type of primer	*КВ-4*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*76*

DESCRIPTION

ВБП-463 is used for engaging tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a fuze (1), nose section (2), cumulative metal insert (5), body of projectile (4), explosive (6) and at the rear is located a tracer (12).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

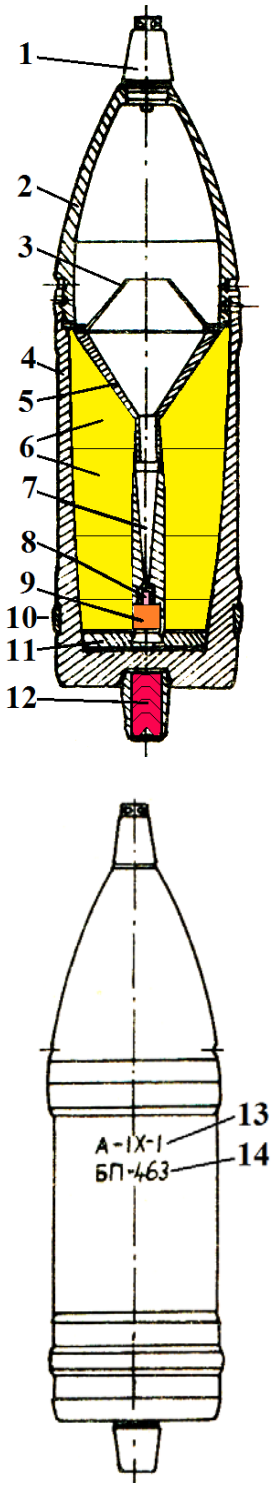
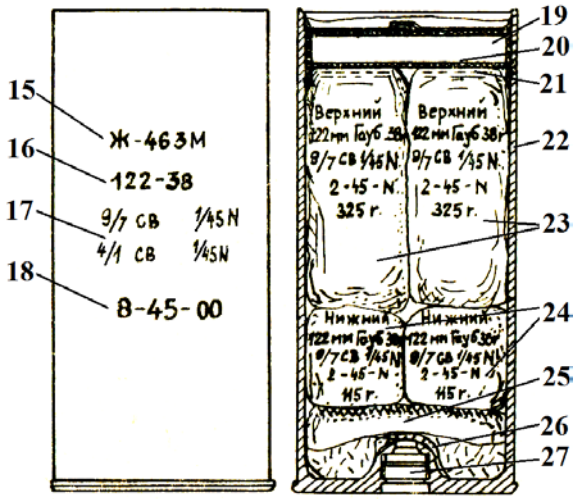
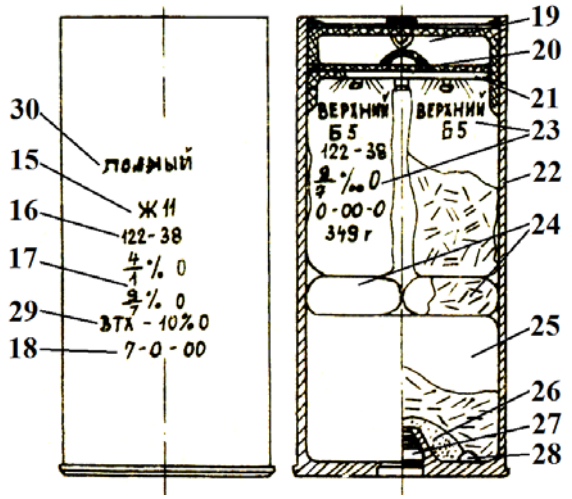
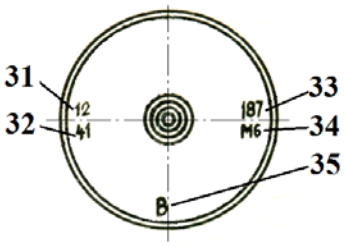
Type	Characteristic
ГКН, ГПВ-2, ГПВ-1	*Nose mounted, superquick, fuze with with secured detonator and holding safety..*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Charge marked Ж11 or Ж-463М contains decoppering agent. Charge marked Ж11А or Ж-463МЖ do not contain decoppering agent.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
PROJECTILE	**CARTRIDGE CASE ASSEMBLY**	
	***Ж-463М, Ж-463МЖ***  ***Ж11, Ж11А***  **BOTTOM** **of the cartridge case** 	*1 - Fuze;* *2 – Nose section;* *3 - Insurance insert;* *4 - Body of projectile;* *5 - Shaped charge liner (cumulative insert);* *6 - Hollow charge;* *7 - Central tube;* *8 - Detonator;* *9 - Booster charge;* *10 - Driving band* *11 - Bottom;* *12 - Tracer;* *13 - Type of explosive;* *14 - Type of projectile "БП-463"* *<u>On the other hand projectile</u>:* *„00" - Symbol of filling factory;* *„1-45" - Series-year of production;* *„122" - Calibre;* *„- -" - Weight sign* *15 - Marking of cartridge case assembly;* *16 - Marking of weapon;* *17 - Marking of powders (type, shape, dimension) and index of manufacturer;* *18 - Series-year of production and symbol of filling factory;* *19 - Reinforced cover (upper);* *20 - Normal cover (bottom);* *21 - Decoppering agent;* *22 - Cartridge case;* *23 - Partial upper bag charges;* *24 - Partial bottom bag charges;* *25 - Basic charge;* *26 - Igniter;* *27 - Primer;* *28 - Locking powder* *29 - Marking of locking powder (type, shape, dimension) and index of manufacturer;* *30 - Marking of full charge „ПОЛНЫЙ"* *31, 32 - Series and year of production of cartridge case;* *33 - Symbol of manufacturer;* *34 - Symbol of control;* *35 - Symbol of inspection.*

FWP Ammunition

ANNEX C-53

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge Armour Piercing*
TYPE	*AP-T*
NAME/ASSIGNED MARK (original)	*ВБП-463А*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *122 mm howitzer M1938 (122H38 or M-30),* *122 mm howitzer M1938/74 (122H38/74 or M-30)* *122 mm self-propelled howitzer SU-122 (SU-122)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*ВБП-463А*	**abbreviation**	*БП-460А*	**abbreviation**	*Ж11, Ж11А, Ж-463М, Ж-463МЖ*
length [*mm*]		**weight [*kg*]**	*13.34*	**type and size of propellant charge**	*4/1+9/7*
average weight [*kg*]		**length [*mm*]**			
		type of explosives	*ТГ-50*	**weight of propellant charge [*kg*]**	*2.00*
initial velocity of projectile [$m.s^{-1}$]	*full charge - 570*	**weight of blasting filler [*kg*]**	*0.80*	**length [*mm*]**	*285*
				material of cartridge case	*Ms, Fe*
maximum range (of fire) [*m*]	*2000*	**type of fuze**	*ГКВ, В-229*	**weight of cartridge case [*kg*]**	*Ms - 3.20* *Fe - 2.90*
				type of primer	*КВ-4*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*76*

DESCRIPTION

ВБП-463А is used for engaging tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a fuze (1), nose piece (2), cumulative metal insert (4), body of projectile (3), explosive (5).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

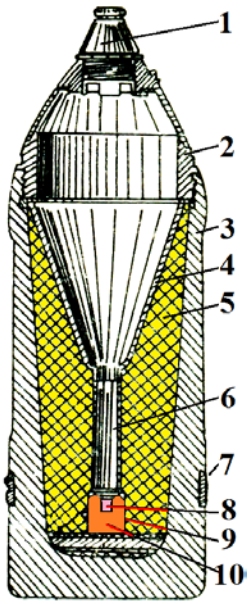
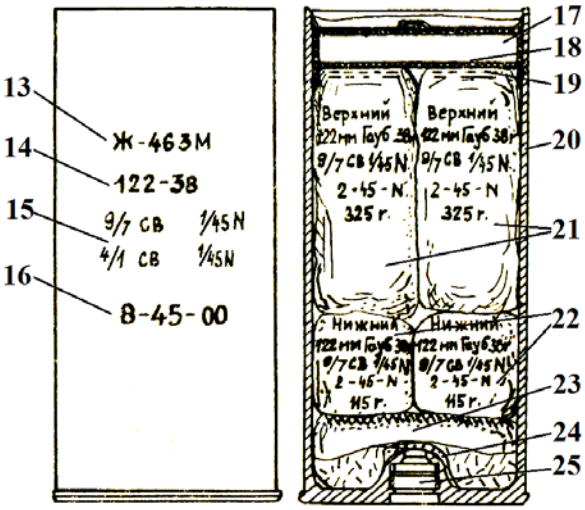
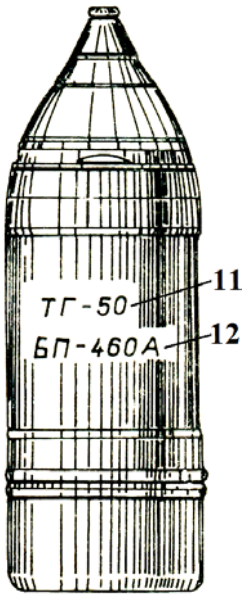
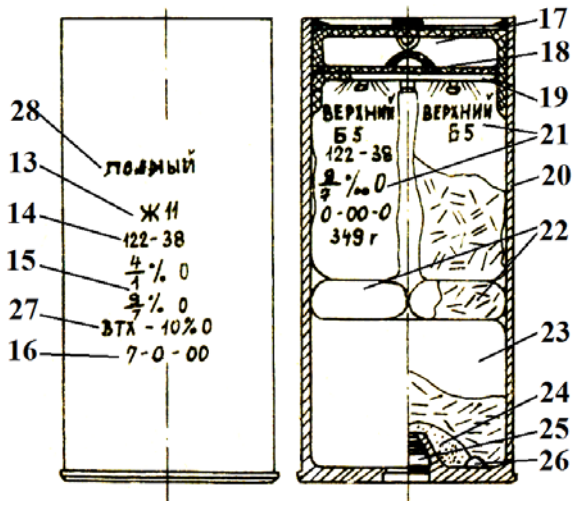
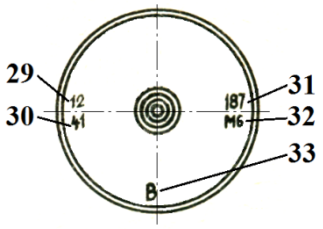
Type	Characteristic
ГКН, ГПВ-2, ГПВ-1	*The head, superquick, seized type fuze with secured detonator.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Charge marked Ж11 or Ж-463М contain decoppering agent. Charge marked Ж11А or Ж-463МЖ are without decoppering agent.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
PROJECTILE	CARTRIDGE CASE ASSEMBLY	
	***Ж-463М, Ж-463МЖ*** 	*1 - Fuze;* *2 - Nose piece;* *3 - Body of projectile;* *4 - Shaped charge liner (cumulative insert);* *5 - Hollow charge;* *6 - Central tube;* *7 - Driving band* *8 - Detonator;* *9 - Case of booster charge;* *10 - Booster charge;* *11 - Type of explosive;* *12 - Type of projectile "БП-460А"* *<u>On the other hand projectile</u>:* *„00" - Symbol of filling factory;* *„1-45" - Series-year of production;* *„122" - Calibre;* *„++" - Weight sign* *13 - Marking of cartridge case assembly;* *14 - Marking of weapon;* *15 - Marking of powders (type, shape, dimension) and index of manufacturer;* *16 - Series-year of production and symbol of filling factory;* *17 - Reinforced cover (upper);* *18 - Normal cover (bottom);* *19 - Decoppering agent;* *20 - Cartridge case;* *21 - Partial upper bag charges;* *22 - Partial bottom bag charges;* *23 - Basic charge;* *24 - Igniter;* *25 - Primer;* *26 - Locking powder* *27 - Marking of locking powder (type, shape, dimension) and index of manufacturer;* *28 - Marking of full charge „ПОЛНЫЙ"* *29, 30 - Series and year of production of cartridge case;* *31 - Symbol of manufacturer;* *32 - Symbol of control;* *33 - Symbol of inspection.*
	***Ж11, Ж11А*** 	
	BOTTOM of the cartridge case	
		

	FWP Ammunition	**ANNEX C-54**

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge Armour Piercing with Tracer - Non-rotating Projectile*
TYPE	*HEAT-FS*
NAME/ASSIGNED MARK (original)	*ЗВБК1*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *122 mm howitzer M1938 (122H38 or M-30),* *122 mm howitzer M1938/74 (122H38/74 or M-30)* *122 mm self-propelled howitzer SU-122 (SU-122)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*ЗВБК1*	**abbreviation**	*БК-463, БК-463М, БК-463У, БК-463УМ*	**abbreviation**	*Ж11, Ж11А, Ж-463М, Ж-463МЖ*
length [*mm*]		**weight [*kg*]**	*21.26*	**type and size of propellant charge**	*4/1+9/7*
average weight [*kg*]		**length [*mm*]**			
		type of explosives	*A-IX-1*	**weight of propellant charge [*kg*]**	*2.00*
initial velocity of projectile [$m.s^{-1}$]	*full charge - 500*	**weight of blasting filler [*kg*]**	*0.936*	**length [*mm*]**	*285*
				material of cartridge case	*Ms, Fe*
maximum range (of fire) [*m*]	*2000*	**type of fuze**	*ГКН, ГПВ-2, ГПВ-1*	**weight of cartridge case [*kg*]**	*Ms - 3.20* *Fe - 2.90*
				type of primer	*КВ-4*

PACKING			
Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*76*

DESCRIPTION

ЗВБК1 is used for a fight against tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of fuze (1), nose piece (2), cumulative metal insert (4), body of projectile (5), explosive (6) and at the rear (in the stabilizer) is located tracer (13).

COLOR and MARKING	
Body colour:	*Light grey*
Text colour:	*Black*

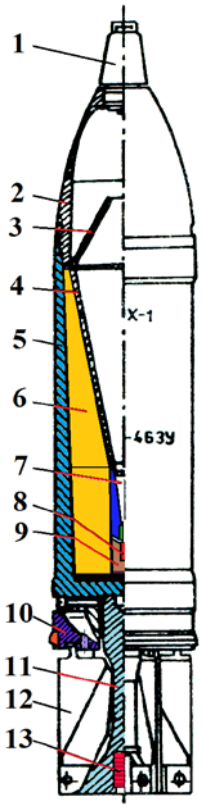
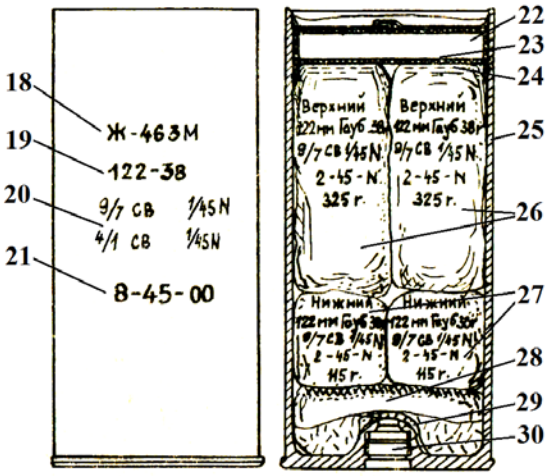
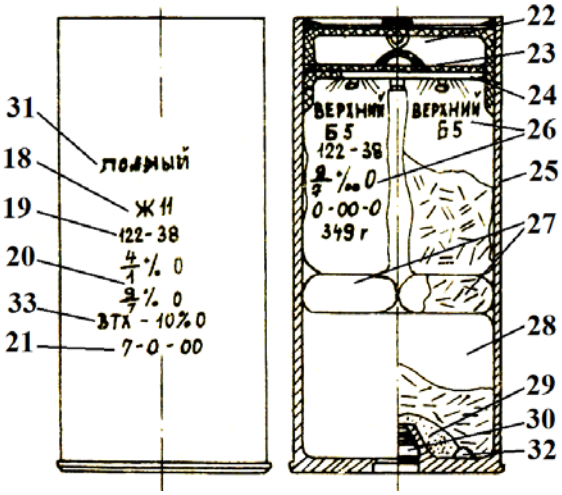
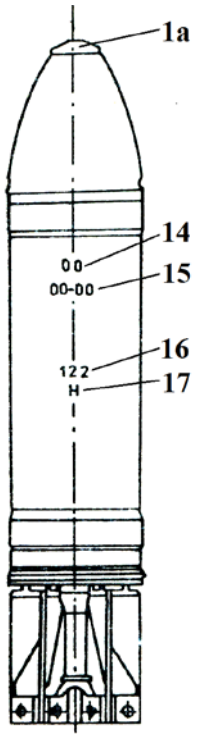
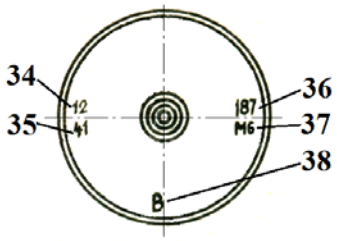
FUZE	
Type	**Characteristic**
ГКН, ГПВ-2, ГПВ-1	*The head, superquick, seized type fuze with secured detonator.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Charge marked Ж11 or Ж-463М contain decoppering agent. Charge marked Ж11А or Ж-463МЖ are without decoppering agent. Projectiles - БК-463, БК-463М, БК-463У, БК-463УМ - letter У means upgrading of projectile; letter М indicates that the driving band is a copper and cumulative metal insert is made of copper.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
PROJECTILE	**CARTRIDGE CASE ASSEMBLY**	
	***Ж-463М, Ж-463МЖ***  ***Ж11, Ж11А*** 	*1 - Fuze;* *1a - Plug;* *2 - Nose piece;* *3 - Insurance insert;* *4 - Shaped charge liner (cumulative insert);* *5 - Body of projectile;* *6 - Hollow charge;* *7 - Central tube;* *8 - Detonator;* *9 - Insert;* *10 - Rotating ring with driving band;* *11 - Stabilizer;* *12 - Fins of stabilizer;* *13 - Tracer;* *14 - Symbol of filling factory;* *15 - Series-year of production;* *16 - Calibre;* *17 - Weight sign;* *<u>On the other hand projectile</u>:* *"А-IX-1" - Type of explosive;* *"БК-463У" - Type of projectile* *18 - Marking of cartridge case assembly;* *19 - Marking of weapon;* *20 - Marking of powders (type, shape, dimension) and index of manufacturer;* *21 - Series-year of production and symbol of filling factory;* *22 - Reinforced cover (upper);* *23 - Normal cover (bottom);* *24 - Decoppering agent;* *25 - Cartridge case;* *26 - Partial upper bag charges;* *27 - Partial bottom bag charges;* *28 - Basic charge;* *29 - Igniter;* *30 - Primer;* *31 - Marking of full charge „ПОЛНЫЙ"* *32 - Locking powder* *33 - Marking of locking powder (type, shape, dimension) and index of manufacturer;* *34, 35 - Series and year of production of cartridge case;* *36 - Symbol of manufacturer;* *37 - Symbol of control;* *38 - Symbol of inspection.*
	**BOTTOM** **of the cartridge case** 	

	FWP Ammunition	ANNEX C-55

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge High Explosive - Fragmentation Practice*
TYPE	*HE-FRAG Practice*
NAME/ASSIGNED MARK (original)	*122-EOFNh-H 38*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *122 mm howitzer M1938 (122H38 or M-30),* *122 mm howitzer M1938/74 (122H38/74 or M-30)* *122 mm self-propelled howitzer SU-122 (SU-122)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*122-EOFNh-H 38*	**abbreviation**	*OFNh-122 H 38*	**abbreviation**	*Nk 122 H 38*
length [*mm*]		**weight [*kg*]**	*21.76*	**type and size of propellant charge**	*Nctp 2.4x0.9/8-(4/1)+ Nc7p 8.3x1.7/13-(9/7)*
average weight [*kg*]		**length [*mm*]**	*564-573*		
		type of explosives	---	**weight of propellant charge [*kg*]**	*2.05*
initial velocity of projectile [$m.s^{-1}$]	*full charge - 515* *charge 8 - 205*	**weight of blasting filler [*kg*]**	---	**length [*mm*]**	*285*
				material of cartridge case	*Ms, Fe*
maximum range (of fire) [*m*]	*full charge - 11800* *charge 8 - 3810*	**type of fuze**	*dummy*	**weight of cartridge case [*kg*]**	*Ms - 3.20* *Fe - 2.90*
				type of primer	*KV-4*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*Ms - 72; Fe - 68*

DESCRIPTION

122-EOF-H 38 is used for training and testing to engage light armoured targets, against tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of body (20), Inert material (21) and fuze - dummy (19).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

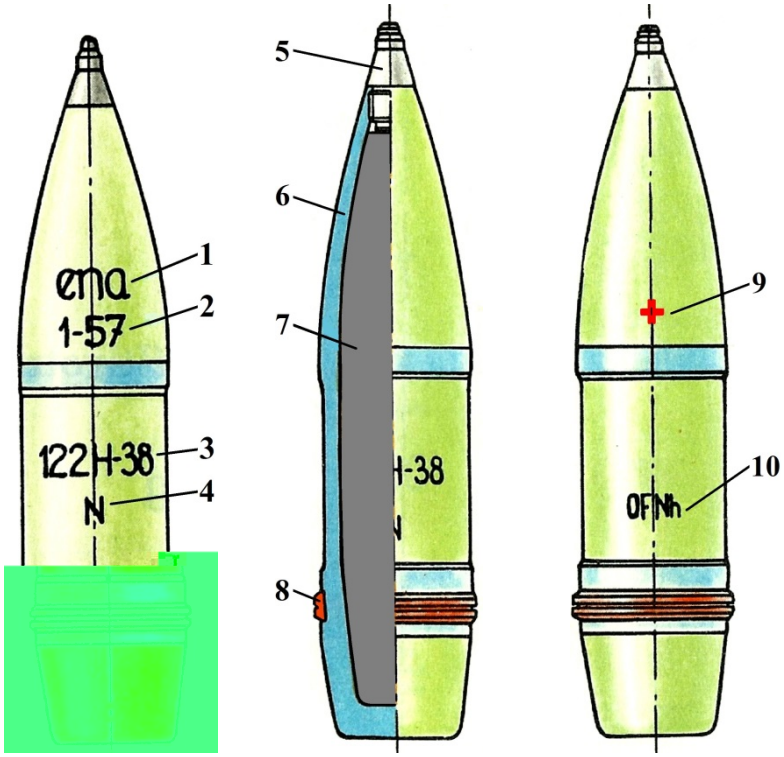
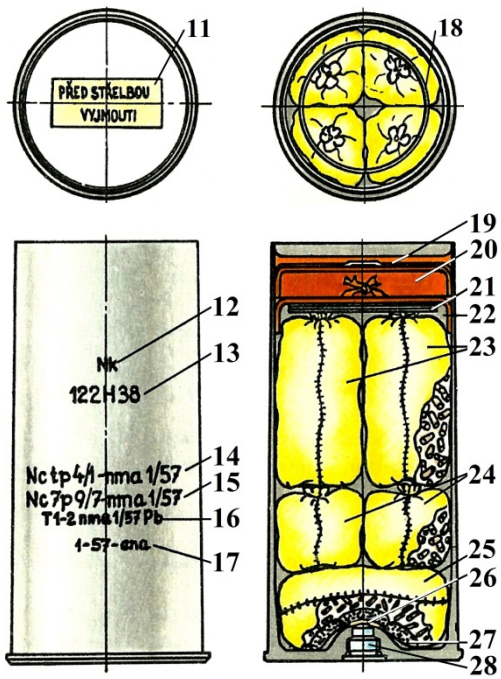
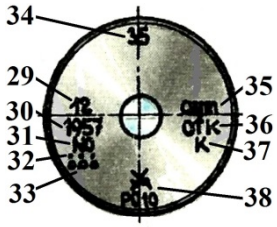
Type	Characteristic
Dummy	*Fuze without explosive.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Driving band were made from copper or alloy of "FeS". When using material FeS is not used the decoppering agent. The cartridge case is made of brass or steel.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre and type of weapon;* *4 - Weight sign;* *5 - Fuze;* *6 - Body of projectile;* *7 - Inert material;* *8 - Driving band;* *9 - Red cross - marking of type projectile;* *10 - Type of projectile - "OFNh"* *11 - The label with the inscription "Before shooting remove";* *12 - Marking of cartridge case assembly;* *13 - Marking of calibre and weapon;* *14, 15 - Marking of powder (type, shape, dimension) and Manufacturer, series/ year of manufacture of powder;* *16 - Type of black powder in igniter and symbol of manufacturer, series/ year of manufacture of black powder and type of decoppering agent;* *17 - Series-year of production and symbol of filling factory;* *18 - Decoppering agent;* *19 - Seal of cartridge case;* *20 - Upper cover - reinforced;* *21 - Decoppering agent;* *22 - Lower cover - normal;* *23 - Upper charges (four components) of powder "Nc7p";* *24 - Lower charges (four components) of powder "Nc7p";* *25 - Basic charge of powder "Nc7p";* *26 - Paper label with the propellant dates;* *27 - Igniter;* *28 - Primer;* *29, 30 - Series, year of manufacture of cartridge case;* *31 - Mark of low thermal heating;* *32 - Number of shots;* *33 - Number of calibration;* *34 - Number of melt;* *35 - Symbol of manufacturer;* *36 - Symbol of manufacturer's control;* *37 - Symbol of production control;* *38 - Symbol of inspection;* *39 - Red cross - marking of type projectile.*
	**BOTTOM of projectile** **BOTTOM of cartridge case** 

	FWP Ammunition	**ANNEX C-56**

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge High Explosive - Fragmentation*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*122-EOF-K 31/37*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *122 mm cannon M1931/37 (122 K 31/37 or A-19)* *122 mm tank gun D25-T (IS-2)* *122 mm self-propelled gun ISU-122 (ISU-122)*

CARTRIDGE	
abbreviation	*122-EOF-K 31/37*
length [*mm*]	
average weight [*kg*]	*41.50*
initial velocity of projectile [$m.s^{-1}$]	*570-800*
maximum range (of fire) [*m*]	*20400*

PROJECTILE	
abbreviation	*OF-471N*
weight [*kg*]	*25.00*
length [*mm*]	*612-618*
type of explosives	*TNT*
weight of blasting filler [*kg*]	*3.352*
type of fuze	*nz 10av,* *nz 10bv,* *nz 11*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Nk* *122 K 31/37*
type and size of propellant charge	*Ngtp 6.8x1.85/450-7.85-(NDT 3)* *+ Ngtp 6.8x1.85/225-7.85-(NDT 3)*
weight of propellant charge [*kg*]	*6.85*
length [*mm*]	*785*
material of cartridge case	*Ms, Fe*
weight of cartridge case [*kg*]	*16.50*
material of decoppering agent	*0.070*
weight of decoppering agent [*kg*]	*SnPb*
type of primer	*KV-4*

PACKING

Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*56*

DESCRIPTION

122-EOF-K 31/37 is used to engage light armoured targets, against tanks, armoured vehicles, reinforced concrete objects. This projectile consists of body (21), explosive charge (22) and fuze (20).

COLOR and MARKING

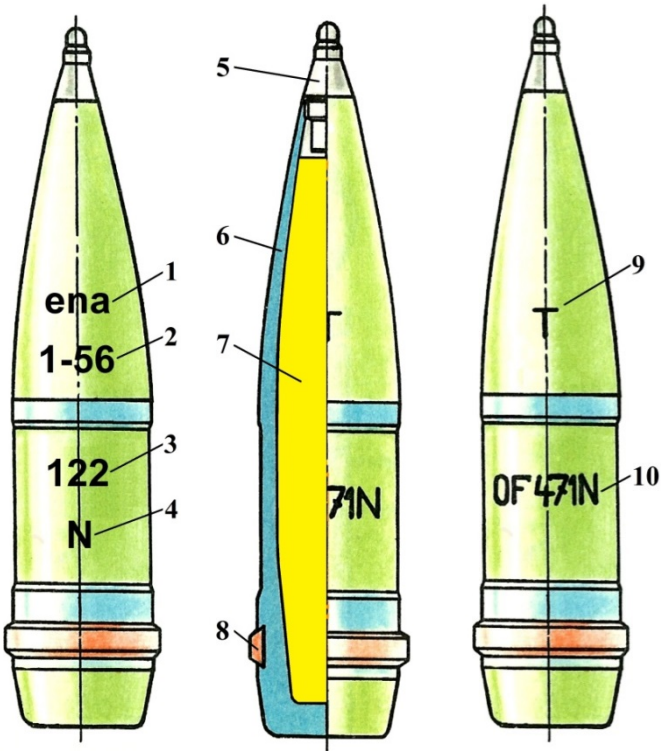
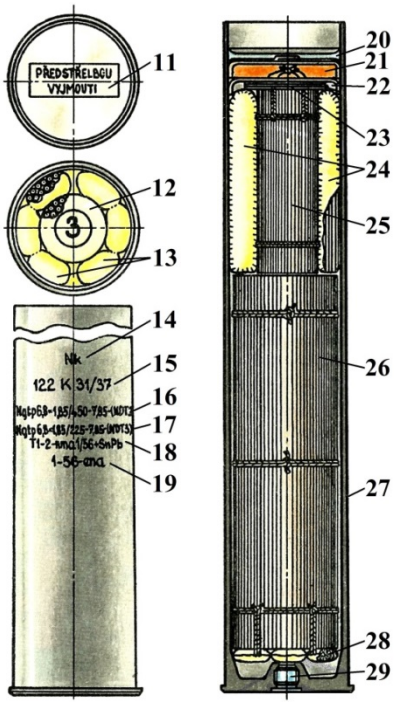
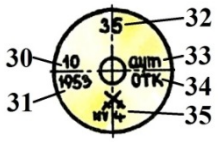
Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
nz 10av, nz 10bv nz 11	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. Fuzes have an adjustable delay, held detonator and provide muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Fuze;* *6 - Body of projectile;* *7 - Explosive charge;* *8 - Driving band;* *9 - Type of explosive;* *10 - Type of projectile - "OF471N"* *11 - The label with the inscription "Before shooting remove";* *12 - The roll of "mitkal";* *13 - Charges (two bags) of powder "Ngtp";* *14 - Marking of cartridge case assembly;* *15 - Marking of calibre and weapon;* *16, 17 - Marking of powder (type, shape, dimension) and Manufacturer, series/ year of manufacture of powder;* *18 - Type of black powder in igniter and symbol of manufacturer, series/ year of manufacture of black powder and type of decoppering agent;* *19 - Series-year of production and symbol of filling factory;* *20 - Seal of cartridge case;* *21 - Upper cover - reinforced;* *22 - Lower cover - normal,* *23 - Decoppering agent;* *24 - Charges (two bags) of powder "Ngtp";* *25 - Charges No. 3 of powder "Ngtp";* *26 - Basic charge of powder "Ngtp";* *27 - Cartridge case;* *28 - Igniter;* *29 - Primer;* *30, 31 - Series, year of manufacture of cartridge case;* *32 - Number of melt;* *33 - Symbol of manufacturer;* *34 - Symbol of control;* *35 - Symbol of inspection.*
	**BOTTOM of cartridge case** 

NOTICE

Driving band were made from copper. The cartridge case is made of brass.

	FWP Ammunition	ANNEX C-57

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge Armour Piercing with Tracer*
TYPE	*AP-T*
NAME/ASSIGNED MARK (original)	*УБР-471Б*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *122 mm cannon M1931/37 (122 K 31/37 or A-19)* *122 mm tank gun D25-T (IS-2)* *122 mm self-propelled gun ISU-122 (ISU-122)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*УБР-471Б*	**abbreviation**	*БР-471Б*	**abbreviation**	*Ж-471 ПОД БРОНЕБОЙНЫЙ*
length [*mm*]		**weight [*kg*]**	*25.00*	**type and size of propellant charge**	*22/1*
average weight [*kg*]		**length [*mm*]**	*415*		
		type of explosives	*A-IX-2*	**weight of propellant charge [*kg*]**	*6.85*
initial velocity of projectile [$m.s^{-1}$]	*780*	**weight of blasting filler [*kg*]**	*0.156*	**length [*mm*]**	*785*
		type of fuze	*MD-8*	**material of cartridge case**	*Ms*
maximum range (of fire) [*m*]				**weight of cartridge case [*kg*]**	*16.50*
				type of primer	*KB-4*

PACKING			
Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*56*

DESCRIPTION

УБР-471Б is used to engage light armoured targets, against tanks, armoured vehicles, reinforced concrete objects. This projectile consists of body (21), explosive charge (22) and fuze (20).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

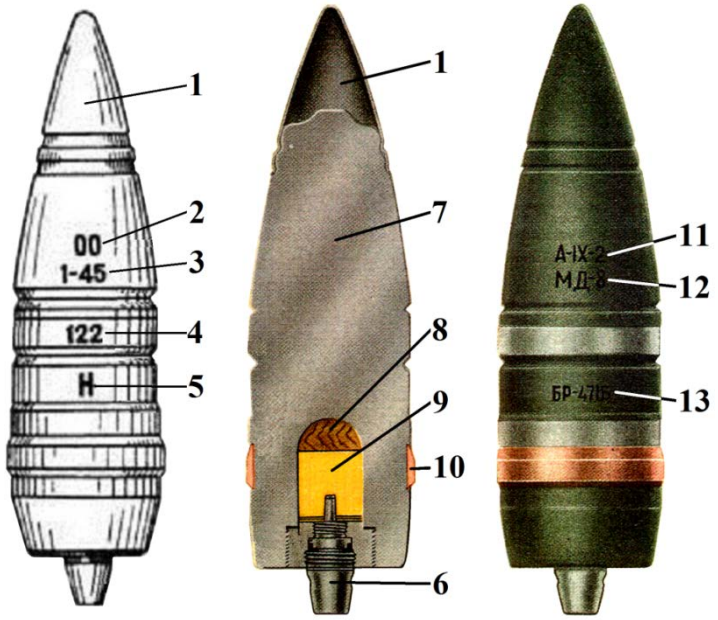
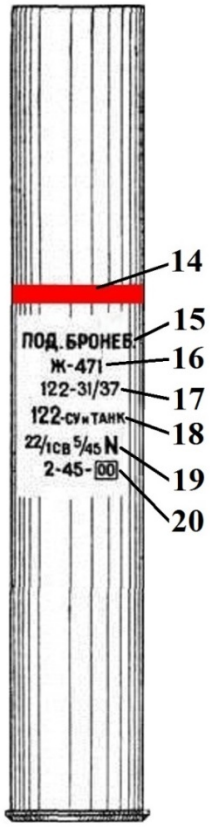
Type	Characteristic
MD-8	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. Fuze has adjustable delay, held detonator and provide muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band are made from copper. The cartridge case is made of brass.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Windshield ;* *2 - Symbol of manufacture;* *3 - Series and year of production of projectile;* *4 - Calibre;* *5 - Weight sign;* *6 - Fuze with tracer;* *7 - Body of projectile;* *8 - Wooden insert;* *9 - Explosive charge;* *10 - Driving band;* *11 - Type of explosive;* *12 - Type of fuze;* *13 - Type of projectile - "БР-471Б";* *14 - Red line -marking of cartridge case assembly used only for AP-T projectile;* *15 - The inscription on the use only for AP-T projectile:* *"ПОД БРОНЕБОЙНЫЙ";* *16 - Marking of type cartridge case assembly;* *17, 18 - Marking of calibre and weapon;* *19 - Marking of powder and series/ year produced and symbol of manufacture;* *20 - Series-year of production and symbol of filling factory.*
CARTRIDGE CASE ASSEMBLY	
	

	FWP Ammunition	**ANNEX C-58**

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge High Explosive - Fragmentation*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*ЗВОФ5*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 122 mm howitzer D30 (2A18) and variants for example D30A, D30Ю;* *122 mm self-propelled howitzer 2C1 ГВОЗДИКА (2A31) and variants*

CARTRIDGE	
abbreviation	*ЗВОФ5*
average weight [*kg*]	*29.22*
initial velocity of projectile [*m.s*$^{-1}$]	*690*
maximum range (of fire) [*m*]	*15300*

PROJECTILE	
abbreviation	*ОФ462* *ОФ462Ж*
weight [*kg*]	*21.76*
length [*mm*]	*552-564*
type of explosives	*TNT*
weight of bursting charge [*kg*]	*3.528*
type of fuze	*РГМ-2* *В-90*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Ж9*
type and size of propellant charge	*12/7-12/1 Тр;* *12/7* пер *ОД +* *12/1* пер *ОД*
weight of propellant charge [*kg*]	*~3.80*
length [*mm*]	*447*
material of cartridge case	*Fe*
weight of cartridge case	*3.66*
type of primer	*КВ-4*
black powder [*kg*]	*0.050*
type of damping propellant	*ВТХ-10*
weight of damping propellant [*kg*]	*0.075*
weight of decoppering agent [*kg*]	*0.10*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*83*

DESCRIPTION

ЗВОФ5 is used for the destruction of enemy artillery, destroying fortified shelters and buildings. This projectile consists of a fuze (16), body of projectile (17) and explosive charge (18).

COLOR and MARKING

Body colour:	*Olive or Grey*
Text colour:	*Black*

FUZE

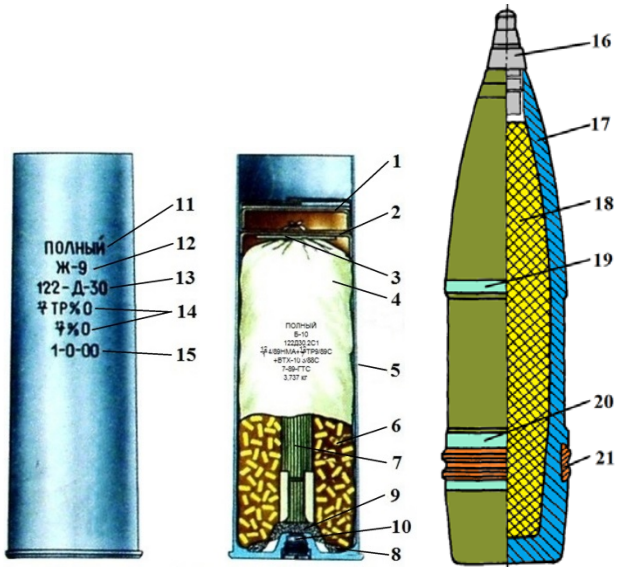
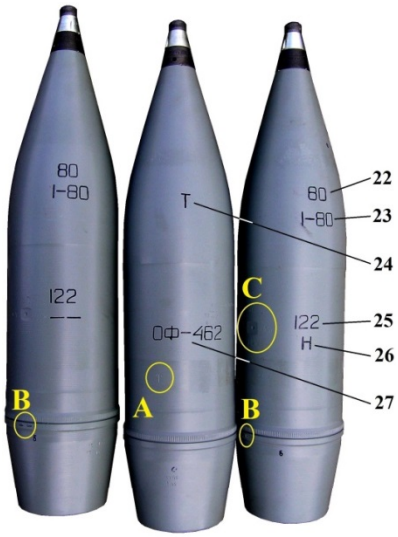
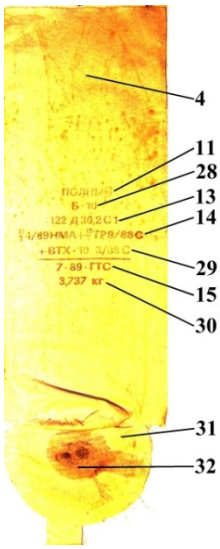
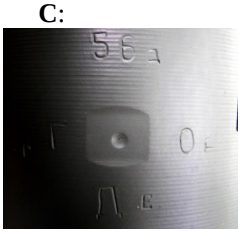
Type	Characteristic
РГМ-2; В-90	*Fuze is nose, impact, with instantaneous and delay settings, safety provided by masking.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Projectile ОФ462 has a driving band made of copper. Projectile ОФ462Ж has a driving band made of FeS material. ОФ462Ж projectiles do not use decoppering agent. The cartridge case is made of steel - surface protection zinc. The cartridge case can be molded in the upper part.

DRAWINGS/CUTAWAY/STENCILING	LEGEND
	*1 - Reinforced cover (upper);* *2 - Normal cover (bottom);* *3 - Decoppering agent;* *4 - Bag charge;* *5 - Cartridge case;* *6 - Seven-perforated propellant;* *7 - Tubular propellant;* *8 - Damping propellant;* *9 - Igniter;* *11 - Marking of full charge „ПОЛНЫЙ“* *12 - Marking of cartridge case assembly;* *13 - Marking of calibre and weapon;* *14 - Marking of propellant (type, shape) and series/ year of manufacture and index of manufacturer of propellant;* *15 - Series-year of production and symbol of filling factory;* *16 - Fuze;* *17 - Body of projectile;* *18 - Bursting charge;* *19 - Upper centring ring;* *20 - Bottom centring ring;* *21 - Driving band;* *22 - Index manufacturer;* *23 - Series - year manufacture a projectile;* *24 - Type of explosive;* *25 - Calibre;* *26 - Weight sign;* *27 - Type of projectile;* *28 - Index of propellant charge;* *29 - Marking of damping propellant type and series-year of manufacture and index of manufacturer;* *30 - Weight of propellant charge;* *31 - Place location of damping propellant;* *32 - Place location in igniter;*
	**BAG CHARGE** (RIPPED - WITHOUT PROPELLANTS) 
A: **B**: **C**:  **D**: 	*<u>Stamped marks</u>:* *A - Double marking of explosive type;* *B - Double marking of weight sign;* *C - Sing for testing the Brinell hardness;* *D - Marking of manufacturer of body - series - year of production of body - mark of main inspector.*

	FWP Ammunition	ANNEX C-59

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge High Explosive - Fragmentation*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*ЗВОФ6*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 122 mm howitzer D30 (2A18) and variants for example D30A, D30Ю;* *122 mm self-propelled howitzer 2C1 ГВОЗДИКА (2A31) and variants*

CARTRIDGE	
abbreviation	*ЗВОФ6*
average weight [*kg*]	*27.85*
initial velocity of projectile [*m.s*$^{-1}$]	*reduced charge - 563* *charge 4 - 275*
maximum range (of fire) [*m*]	*reduced charge - 12874* *charge 4 - 6356*

PROJECTILE	
abbreviation	*ОФ462* *ОФ462Ж*
weight [*kg*]	*21.76*
length [*mm*]	*552-564*
type of explosives	*TNT*
weight of bursting charge [*kg*]	*3.528*
type of fuze	*РГМ-2* *B-90*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Ж10*
type and size of propellant charge	*4/1 + 9/7;* *4/1* пер *ОД +* *9/7* пер *ОД*
weight of propellant charge [*kg*]	*2.49*
length [*mm*]	*447*
material of cartridge case	*Fe*
weight of cartridge case	*3.66*
type of primer	*КВ-4*
black powder [*kg*]	*0.050*
type of damping propellant	*ВТХ-10*
weight of damping propellant [*kg*]	*0.020*
weight of decoppering agent [*kg*]	*0.010*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*80*

DESCRIPTION

ЗВОФ6 is used for the destruction of enemy artillery, destroying fortified shelters and buildings. This projectile consists of a fuze (16), body of projectile (17) and explosive charge (18).

COLOR and MARKING

Body colour:	*Olive or Grey*
Text colour:	*Black*

FUZE

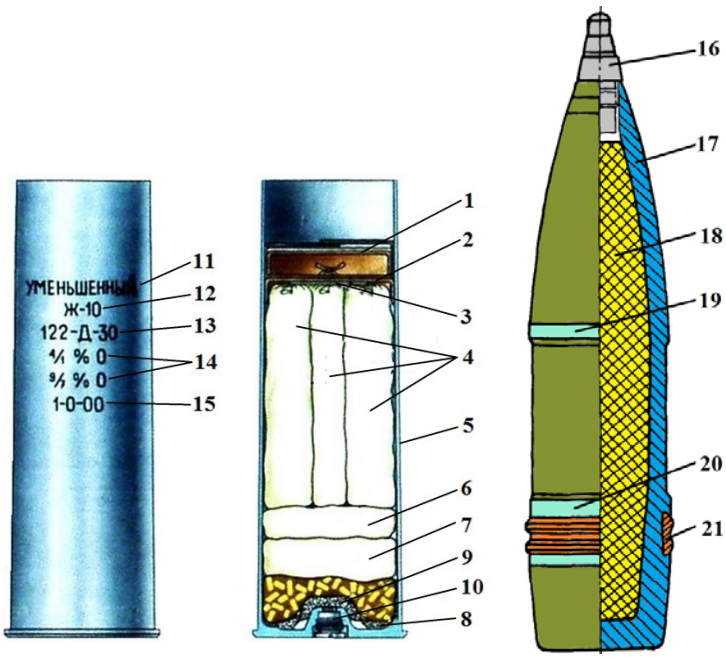
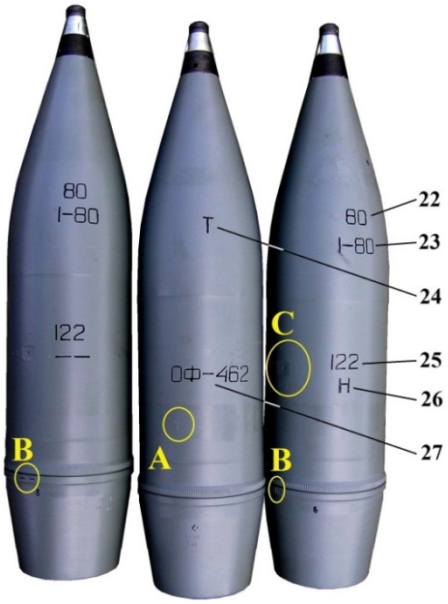
Type	Characteristic
РГМ-2; B-90	*Fuze is nose, impact, with instantaneous and delay settings, safety provided by masking.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Projectile ОФ462 has a driving band made of copper. Projectile ОФ462Ж has a driving band made of FeS material. ОФ462Ж projectiles do not use decoppering agent. The cartridge case is made of steel - surface protection zinc. The cartridge case can be molded in the upper part.

DRAWINGS/CUTAWAY/STENCILING	LEGEND
  **A**: **B**: **C**: **D**: 	*1 - Reinforced cover (upper);* *2 - Normal cover (bottom);* *3 - Decoppering agent;* *4 - Upper charges (three components - 3 x 0,515 kg of 9/7 propellant);* *5 - Cartridge case;* *6 - Bottom bag charge (0,34 kg of 9/7 propellant);* *7 - Basic charge (0,6 kg of 4/1 propellant);* *8 - Damping propellant;* *9 - Igniter;* *10 - Primer KB-4;* *11 - Type of cartridge case with reduced bag charge = "УМЕНЬШЕННЫЙ";* *12 - Marking of cartridge case assembly;* *13 - Marking of calibre and weapon;* *14 - Marking of powder (type, shape) and series/ year of manufacture and index of manufacturer of propellant;* *15 - Series-year of production and symbol of filling factory;* *16 - Fuze;* *17 - Body of projectile;* *18 - Bursting charge;* *19 - Upper centring ring;* *20 - Bottom centring ring;* *21 - Driving band;* *22 - Index manufacturer;* *23 - Series - year manufacture a projectile;* *24 - Type of explosive;* *25 - Calibre;* *26 - Weight sign;* *27 - Type of projectile;* *<u>Stamped marks</u>:* *A - Double marking of explosive type;* *B - Double marking of weight sign;* *C - Sing for testing the Brinell hardness;* *D - Marking of manufacturer of body - series and year of production of body - mark of main inspector.*

FWP Ammunition

ANNEX C-60

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge Armour Piercing with Tracer - Rotating Projectile*
TYPE	*HEAT-FS*
NAME/ASSIGNED MARK (original)	*3ВБП3*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 122 mm howitzer D30 (2A18) and variants for example D30A, D30Ю;* *122 mm self-propelled howitzer 2C1 ГВОЗДИКА (2A31) and variants*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*3ВБП3*	**abbreviation**	*БП1*	**abbreviation**	*Ж8*
average weight [*kg*]	*28.96*	**weight [*kg*]**	*14.80*	**type and size of propellant charge**	*9/7-12/1 Тр*
initial velocity of projectile [$m.s^{-1}$]	*740*	**length [*mm*]**		**weight of propellant charge [*kg*]**	*3.10*
		type of explosives	*A-IX-1*		
maximum range (of fire) [*m*]	*2000*	**weight of bursting charge [*kg*]**		**length [*mm*]**	*447*
		type of fuze	*ГКН; ГПВ-3*	**material of cartridge case**	*Fe*
				weight of cartridge case	*3.66*
				type of primer	*КВ-4*
				black powder [*kg*]	*0.050*
				type of damping propellant	*ВТХ-10*
				weight of damping propellant [*kg*]	*0.060*
				weight of decoppering agent [*kg*]	*0.010*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*80*

DESCRIPTION

3ВБК3 is used against tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a fuze (16), nose piece (17), and cumulative metal insert (21), body of projectile (20), explosive (21a) and tracer (29).

COLOR and MARKING

Body colour:	*Olive or Grey*
Text colour:	*Black*

FUZE

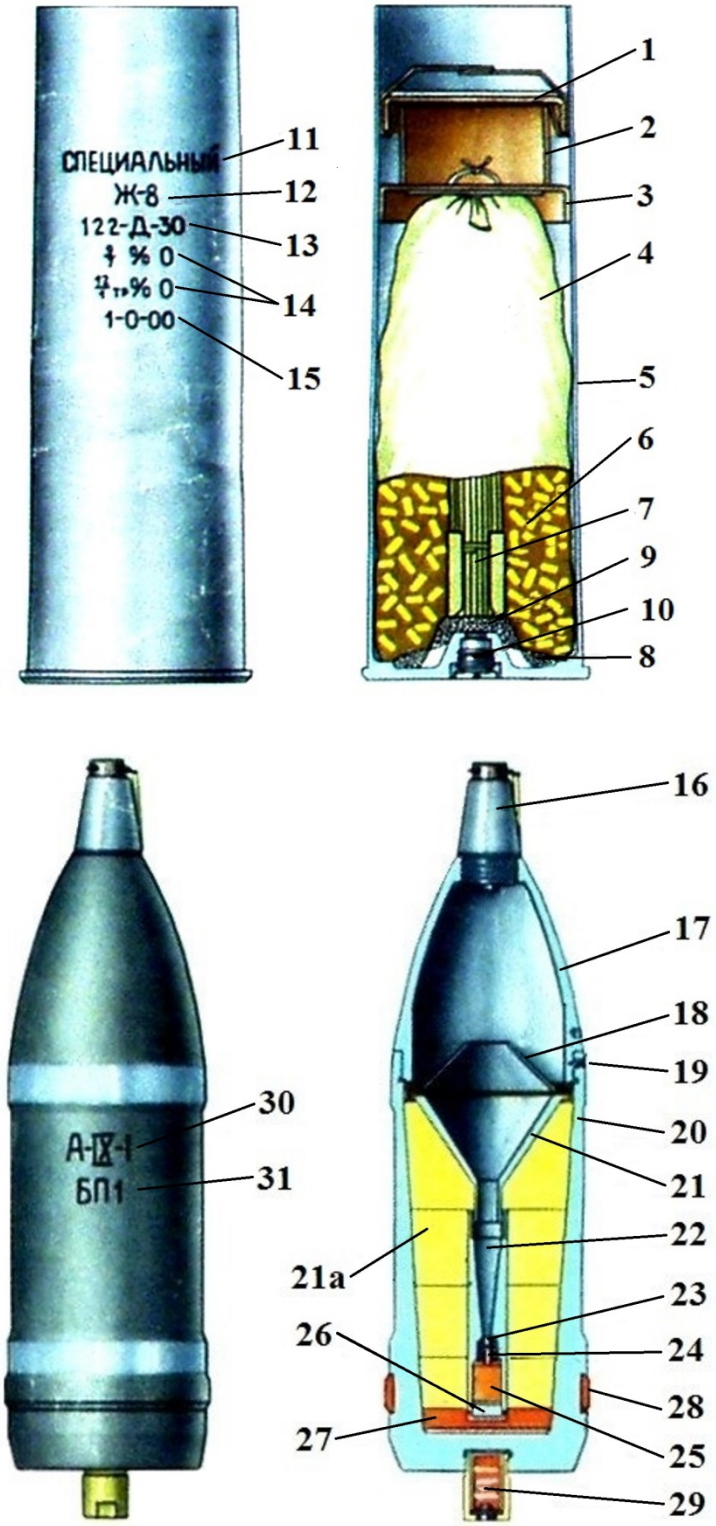
Type	Characteristic
ГКН; ГПВ-3	*Fuze is impact with nose and base components, safety is provided by masking.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

The cartridge case is made of steel - surface protection zinc. The cartridge case can be molded in the upper part. The cartridge case assembly does not contain a decoppering agent.

DRAWINGS/CUTAWAY/STENCILING:	LEGEND
	*1 - Reinforced cover (upper);* *2 - Tube expansion - spacer;* *3 - Normal cover (bottom);* *4 - Bag charge;* *5 - Cartridge case;* *6 - Seven-perforated propellant;* *7 - Tubular propellant;* *8 - Damping propellant;* *9 - Igniter;* *10 - Primer KB-4;* *11 - Marking of full charge „СПЕЦИАЛЬНЫЙ“* *12 - Marking of cartridge case assembly;* *13 - Marking of calibre and weapon;* *14 - Marking of powder (type, shape) and series/ year of manufacture and index of manufacturer of propellant;* *15 - Series-year of production and symbol of filling factory;* *16 - Fuze;* *17 - Nose piece;* *18 - Touch cone;* *19 - Lock screw;* *20 - Body of projectile;* *21 - Shaped charge liner (cumulative insert);* *21a - Hollow charge;* *22 - Transfer tube;* *23 - Detonator;* *24 - Insert;* *25 - Booster charge;* *26 - The bottom;* *27 - Pads;* *28 - Driving band;* *29 - Tracer;* *30 - Type of explosive;* *31 - Type of projectile;* *<u>Marking on the opposite side</u>:* *“XY” - Index manufacturer;* *“00-00” - Series - year manufacture a projectile;* *“122” - Calibre;* *“- - “ - Weight sign*

FWP Ammunition

ANNEX C-61

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge Armour Piercing with Tracer - Non-rotating Projectile*
TYPE	*HEAT-FS*
NAME/ASSIGNED MARK (original)	*ЗВБК3*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 122 mm howitzer D30 (2A18) and variants for example D30A, D30Ю;* *122 mm self-propelled howitzer 2C1 "ГВОЗДИКА" (2A31) and variants*

CARTRIDGE	
abbreviation	*ЗВБК3*
average weight [*kg*]	*28.96*
initial velocity of projectile [$m.s^{-1}$]	*723*
maximum range (of fire) [*m*]	*2000*

PROJECTILE	
abbreviation	*БК6* *БК6М*
weight [*kg*]	*17.47*
length [*mm*]	*707*
type of explosives	*A-IX-1*
weight of bursting charge [*kg*]	*1.60*
type of fuze	*ГПВ-2*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Ж9*
type and size of propellant charge	*12/7-12/1 Тр;* *12/7* пер *ОД* + *12/1* пер *ОД*
weight of propellant charge [*kg*]	*3.80*
length [*mm*]	*447*
material of cartridge case	*Fe*
weight of cartridge case	*3.66*
type of primer	*КВ-4*
black powder [*kg*]	*0.050*
type of damping propellant	*ВТХ-10*
weight of damping propellant [*kg*]	*0.075*
weight of decoppering agent [*kg*]	*0.010*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*83*

DESCRIPTION

ЗВБК3 is used for engaging tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a fuze (16), nose piece (17), and cumulative metal insert (20a), body of projectile (20), explosive (21) and tracer (30).

COLOR and MARKING

Body colour:	*Olive or Grey*
Text colour:	*Black*

FUZE

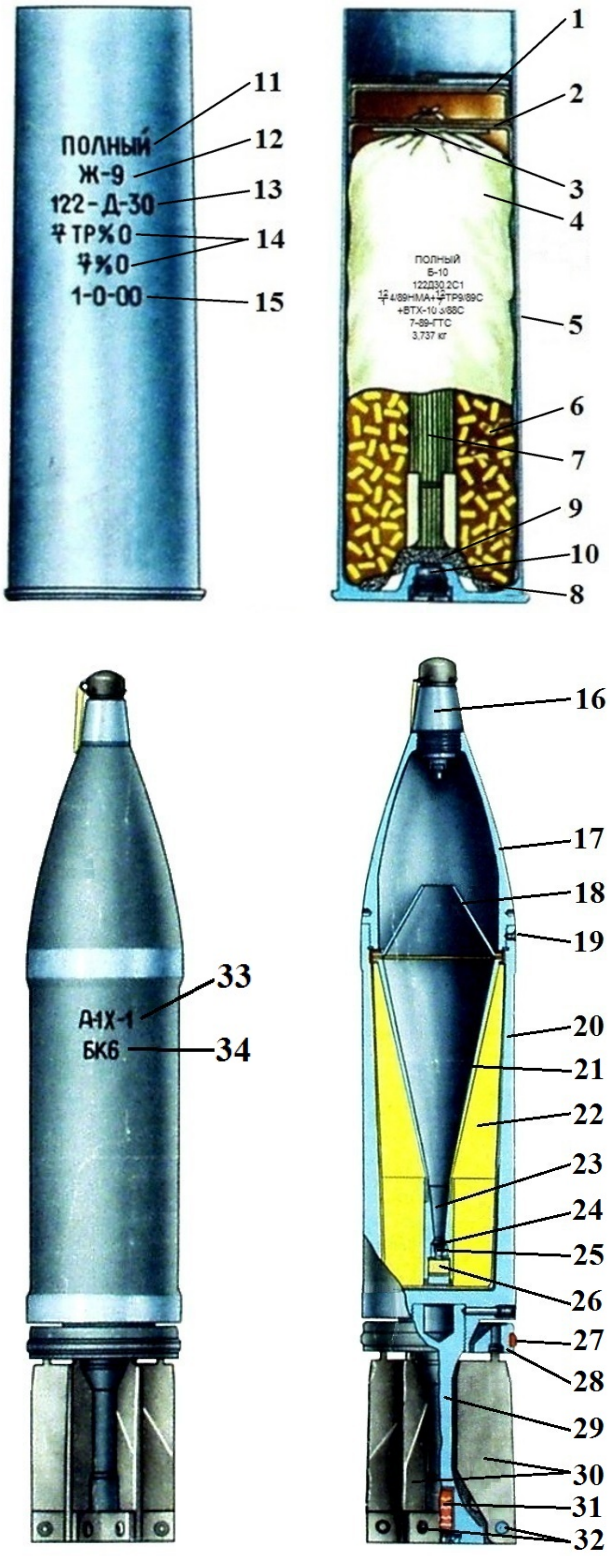
Type	Characteristic
ГПВ-2	*Fuze is impact with nose and base components, safety is provided by masking*

SAFETY CONSIDERATION THREAT

Do not touch anddo not move unexploded projectile.

NOTICE

The cartridge case is made of steel - surface protection zinc. The cartridge case can be molded in the upper part. Projectile "БК6М" has cumulative insert of copper.

DRAWINGS/CUTAWAY/STENCILING	LEGEND
	*1 - Reinforced cover (upper);* *2 - Normal cover (bottom);* *3 - Decoppering agent;* *4 - Bag charge;* *5 - Cartridge case;* *6 - Seven-perforated propellant;* *7 - Tubular propellant;* *8 - Damping propellant;* *9 - Igniter;* *10 - Primer КВ-4;* *11 - Marking of full charge „ПОЛНЫЙ“* *12 - Marking of cartridge case assembly;* *13 - Marking of calibre and weapon;* *14 - Marking of powder (type, shape) and series/ year of manufacture and index of manufacturer of propellant;* *15 - Series-year of production and symbol of filling factory;* *16 - Fuze;* *17 - Nose piece;* *18 - Touch cone;* *19 - Lock screw;* *20 - Body of projectile;* *21 - Shaped charge liner (cumulative insert);* *22 - Hollow charge;* *23 - Transfer tube;* *24 - Detonator;* *25 - Insert;* *26 - Booster charge;* *27 - Driving band;* *28 - Rotating ring;* *29 - Stabilizer;* *30 - Fins;* *31 - Tracer;* *32 - Connecting pin* *33 - Type of explosive;* *34 - Type of projectile;* <u>Marking on the opposite side</u>: *“XY” - Index manufacturer;* *“00-00” - Series - year manufacture of projectile;* *“122” - Calibre;* *“- - “ - Weight sign*

	FWP Ammunition	**ANNEX C-62**

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge Armour Piercing with Tracer - Non-rotating Projectile*
TYPE	*HEAT-FS*
NAME/ASSIGNED MARK (original)	*ЗВБК9*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 122 mm howitzer D30 (2A18) and variants for example D30A, D30Ю;* *122 mm self-propelled howitzer 2C1 ГВОЗДИКА (2A31) and variants*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*ЗВБК9*	**abbreviation**	*БК13*	**abbreviation**	*Ж9*
average weight [*kg*]	*25.66*	**weight [*kg*]**	*18.20*	**type and size of propellant charge**	*12/7-12/1 Тр; 12/7 пер ОД + 12/1 пер ОД*
initial velocity of projectile [$m.s^{-1}$]	*723*	**length [*mm*]**	*637*		
		type of explosives	*A-IX-1*		
maximum range (of fire) [*m*]	*2000*	**weight of bursting charge [*kg*]**	*1.80*	**weight of propellant charge [*kg*]**	*3.80*
		type of fuze	*B-15*	**length [*mm*]**	*447*
				material of cartridge case	*Fe*
				weight of cartridge case	*3.66*
				type of primer	*KB-4*
				black powder [*kg*]	*0.050*
				type of damping propellant	*BTX-10*
				weight of damping propellant [*kg*]	*0.075*
				weight of decoppering agent [*kg*]	*0.010*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*80*

DESCRIPTION

ЗВБК9 is used for engaging tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a fuze (16), cumulative metal insert (24), body of projectile (25a), explosive (25) and tracer (33).

COLOR and MARKING

Body colour:	*Olive or Grey*
Text colour:	*Black*

FUZE

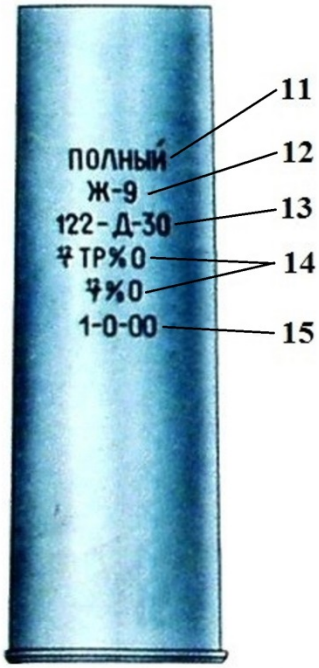
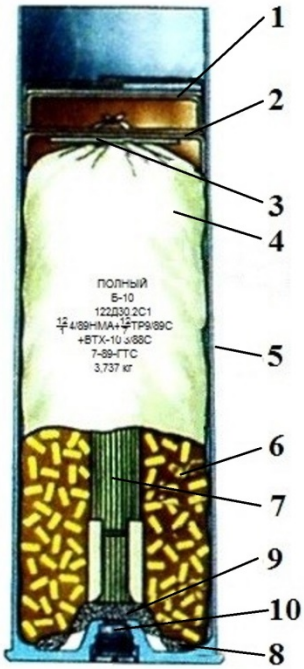
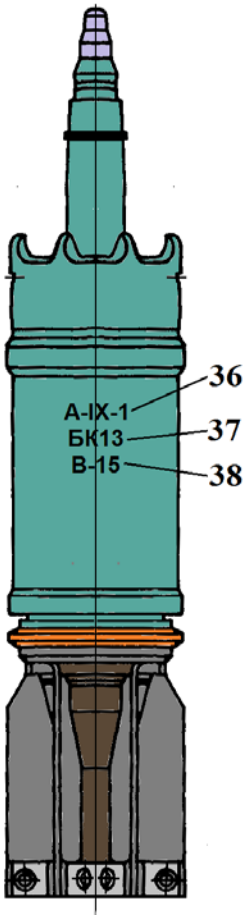
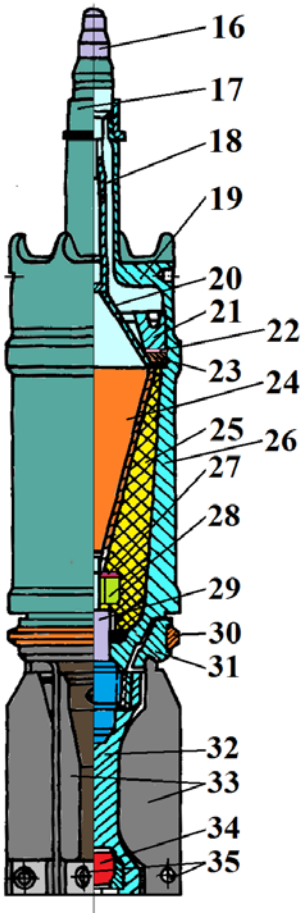
Type	Characteristic
B-15	*Fuze is impact with nose and base components, safety is provided by masking*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

The cartridge metal case is made of steel - surface protection zinc. The cartridge case can be molded in the upper part.

DRAWINGS/CUTAWAY/STENCILING	LEGEND
   	*1 - Reinforced cover (upper);* *2 - Normal cover (bottom);* *3 - Decoppering agent;* *4 - Bag charge;* *5 - Cartridge case;* *6 - Seven-perforated propellant;* *7 - Tubular propellant;* *8 - Damping propellant;* *9 - Igniter;* *10 - Primer КВ-4;* *11 - Marking of full charge „ПОЛНЫЙ“* *12 - Marking of cartridge case assembly;* *13 - Marking of calibre and weapon;* *14 - Marking of powder (type, shape) and series/ year of manufacture and index of manufacturer of propellant;* *15 - Series-year of production and symbol of filling factory;* *16 - Fuze;* *17 - Fixing nut;* *18 -Contact tube;* *19 - Distance extension;* *20 - Touch cone;* *21 - Connecting nut;* *22 - Insulating ring;* *23 - Cuff;* *24 - Shaped charge liner (cumulative insert);* *25 - Hollow charge;* *26 - Body of projectile;* *27 - Contact;* *28 - Insert;* *29 - Bottom part of fuze;* *30 - Driving band;* *31 - Rotating ring;* *32 - Stabilizer;* *33 - Fins;* *34 - Tracer;* *35 - Connecting pin;* *36 - Type of explosive;* *37 - Type of projectile;* *38 - Type of fuze;* *<u>Marking on the opposite side</u>:* *“XY” - Index manufacturer;* *“00-00” - Series - year manufacture a projectile;* *“122” - Calibre;* *“- - “ - Weight sign*

FWP Ammunition

ANNEX C-63

FIELD of AMMUNITION	*artillery*
CALIBER	*122 mm*
NAME	*122 mm Separate Cartridge High Explosive - Fragmentation Practice*
TYPE	*HE-FRAG Practice*
NAME/ASSIGNED MARK (original)	*122-EOFNh-D30, 2S1*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 122 mm howitzer D30 (2A18) and variants for example D30A, D30Ю;* *122 mm self-propelled howitzer 2C1 ГВОЗДИКА (2A31) and variants*

CARTRIDGE	
abbreviation	*122-EOFNh-D30, 2S1*
average weight [*kg*]	*29.22*
initial velocity of projectile [*m.s*$^{-1}$]	*690*
maximum range (of fire) [*m*]	*15300*

PROJECTILE	
abbreviation	*ОФ462; ОФ462Ж*
weight [*kg*]	*21.76*
length [*mm*]	*552-564*
type of explosives	---
type of fuze	*РГМ-2, В-90 - dummy*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Ж9-1*
type and size of propellant charge	*12/7-12/1 Тр;* *12/7* пер *ОД + 12/1* пер *ОД*
weight of propellant charge [*kg*]	*~3.80*
length [*mm*]	*447*
material of cartridge case	*Fe*
weight of cartridge case	*3.66*
type of primer	*КВ-4*
black powder [*kg*]	*0.050*
type of damping propellant	*ВТХ-10*
weight of damping propellant [*kg*]	*0.075*
weight of decoppering agent [*kg*]	*0.10*

PACKING

Number of rounds in the crate	*2*	**Weight of full crate [*kg*]**	*83*

DESCRIPTION

122-EOFNh-D30, 2S1 is used for training and testing the destruction of enemy artillery, fortified shelter and buildings. This projectile consists of a body (17), inert material (18) and fuze - dummy (16).

COLOR and MARKING

Body colour:	*Olive or Gray*
Text colour:	*Black*

FUZE

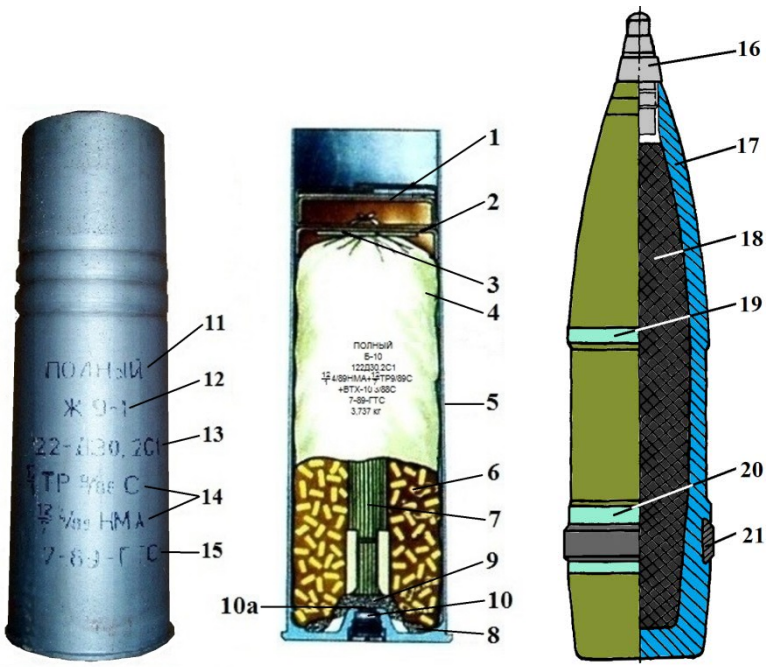
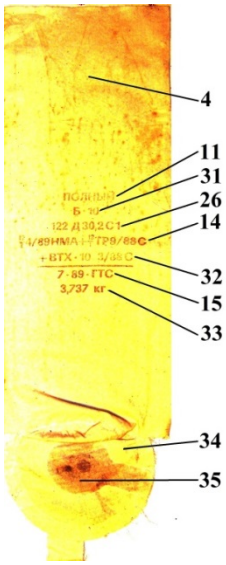
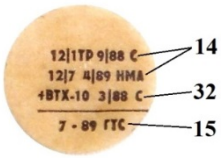
Type	**Characteristic**
Dummy	*Fuze without explosive.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Projectile ОФ462 has a driving band made of copper. Projectile ОФ462Ж has a driving band of FeS material is labelled or a specially marked "FeS". Decoppering agent is not used when fitted with a FeS driving band. The cartridge metal case is made of steel - surface protection zinc. The cartridge case can be molded in the upper part.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Reinforced cover (upper);* *2 - Normal cover (bottom);* *3 - Decoppering agent;* *4 - Bag charge;* *5 - Cartridge case;* *6 - Seven-perforated propellant;* *7 - Tubular propellant;* *8 - Damping propellant;* *9 - Igniter;* *10 - Primer KB-4;* *10a - Control label of paper;* *11 - Marking of full charge „ПОЛНЫЙ“* *12 - Marking of cartridge case assembly;* *13 - Marking of calibre and weapon;* *14 - Marking of powder (type, shape) and series/year of manufacture and index of manufacturer of propellant;* *15 - Series-year of production and symbol of filling factory;* *16 - Fuze;* *17 - Body of projectile;* *18 - Inert material;* *19 - Upper centring ring;* *20 - Bottom centring ring;* *21 - Driving band „FeS“;* *22 - Red cross - marking of type fuze - dummy;* *23 - Specially marked "FeS" for driving band of FeS material;* *24 - Type of projectile;* *25 - Index, that they maintain the same ballistic properties;* *26 - Calibre and type of weapon;* *27 - Series (missing) - year of production of shot and manufacturer;* *28 - Red cross and stamped marks - marking of type projectile;* *29, 30 - Marking of shooting range* *31 - Index of propellant charge;* *32 - Marking of damping propellant (type) and series-year of manufacture and index of manufacturer;* *33 - Weight of propellant charge;* *34 - Place location of damping propellant;* *35 - Igniter locator.*
	BAG CHARGE (RIPPED - WITHOUT PROPELLANTS) 
	CONTROL LABEL 

	FWP Ammunition	ANNEX C-64

FIELD of AMMUNITION	*artillery*
CALIBER	*125 mm*
NAME	*125 mm Separate Cartridge High Explosive - Fragmentation*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*3ВОФ22*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *125 mm tank gun 2A45 (tank T64),* *125 mm tank gun 2A46 (D81 tank T64A),* *125 mm tank gun 2A46M (D81M -tank T72),* *125 mm tank gun 2A46M1 (tank T80 and T90),* *125 mm anti-tank gun 2A45 Sprut-A,* *125 mm anti-tank gun 2A45M Sprut-B* *125 mm self-propelled anti-tank gun 2S25A Sprut-SD*

CARTRIDGE	
abbreviation	*3ВОФ22*
average weight [*kg*]	*28.89*
initial velocity of projectile [*m.s*$^{-1}$]	*850*
maximum range (of fire) [*m*]	*9400*

PROJECTILE	
abbreviation	*ОФ19*
weight [*kg*]	*23.00*
length [*mm*]	*618*
type of explosives	*TNT*
weight of bursting charge [*kg*]	*3.148*
type of fuze	*B-429E*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Ж40*
type and size of propellant charge	*15/1 Тр В/А, 12/7 В/А and ВТХ-20*
weight of propellant charge [*kg*]	*5.885*
length [*mm*]	*408*
material of cartridge metal part case	*Fe*
material of cartridge combustible part case	*cellulose nitrocellulose TNT*
type of primer	*ГУВ-7*

PACKING			
Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*60*

DESCRIPTION

3ВОФ22 is used to engage light armoured targets, tanks, armoured vehicles, reinforced concrete objects. This projectile consists of a fuze (14), body of projectile (15), explosive charge (16), stabilizer (18) and fins of stabilizer (19).

COLOR and MARKING	
Body colour:	*Gray*
Text colour:	*Black*

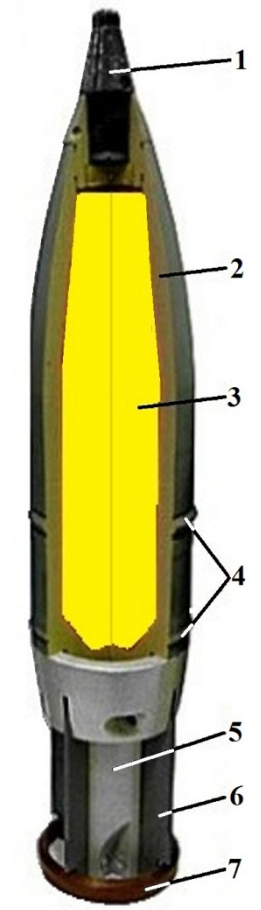
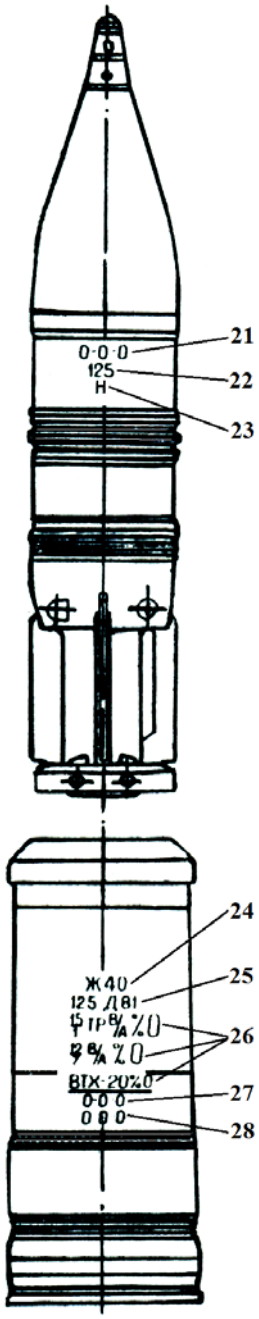
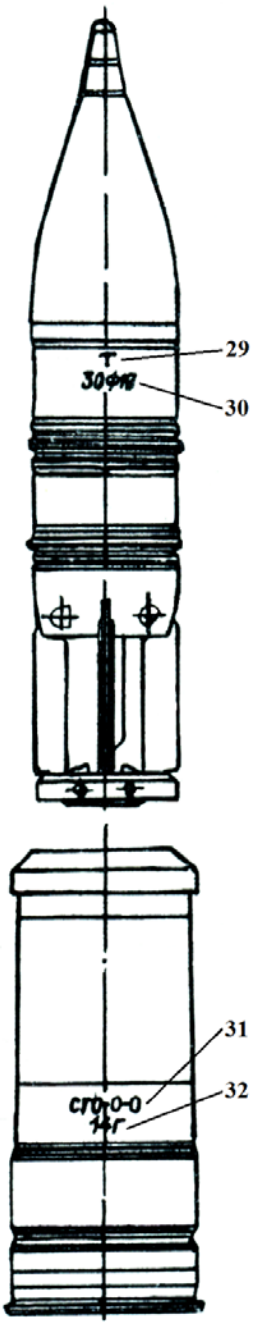
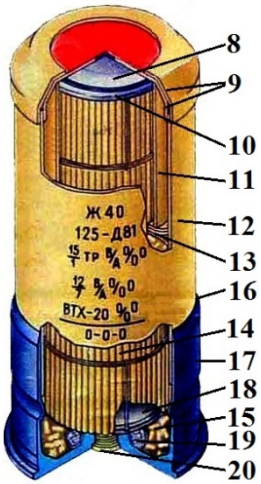
FUZE	
Type	**Characteristic**
B-429E	*The nose fuze is impact, with instantaneous and delay functions, secured with a masking safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

The cartridge metal case is made of steel - surface protection zinc.

DRAWINGS/CUTAWAY/STENCILING			LEGEND
			*1 - Fuze;* *2 - Body;* *3 - Explosive charge;* *4 - Sealing rings;* *5 - Stabilizer;* *6 - Fins of stabilizer;* *7 - Retaining ring;* *8 - Decoppering agent;* *9 - Covers;* *10 - Upper igniter;* *11 - Distance tube;* *12 - Cartridge combustible case;* *13 - Cardboard rings;* *14 - Tubular propellant;* *15 - Seven-perforated propellant;* *16 -Sealant;* *17 - Cartridge metal case;* *18 - Bottom igniter;* *19 - Damping propellant;* *20 - Primer;* *21 - Index manufacturer - series - year manufacture a projectile;* *22 - Calibre;* *23 - Weight sign;* *24 - Marking of cartridge case assembly;* *25 - Marking of weapon;* *26 - Marking of powders (type, shape, dimension) and index of manufacturer;* *27 - Index filling factory - series - year manufacture a cartridge case assembly;* *28 - Index completing factory - series - year completing a cartridge case assembly;* *29 - Type of explosive;* *30 - Type of projectile;* *31 - Index manufacturer - series - year manufacture a cartridge half combustible case assembly;* *32 - Weight added propellant.*
	**PROJECTILE IN FLIGHT**		

	FWP Ammunition	ANNEX C-65

FIELD of AMMUNITION	*artillery*
CALIBER	*125 mm*
NAME	*125 mm Separate Cartridge Armour Piercing, Fin Stabilized, Discarding Sabot- Tracer*
TYPE	*APFSDS-T*
NAME/ASSIGNED MARK (original)	*3ВБМ3*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 125 mm tank gun 2A45 (tank T64), 125 mm tank gun 2A46 (D81 tank T64A), 125 mm tank gun 2A46M (D81M -tank T72), 125 mm tank gun 2A46M1 (tank T80 and T90), 125 mm anti-tank gun 2A45 Sprut-A, 125 mm anti-tank gun 2A45M Sprut-B 125 mm self-propelled anti-tank gun 2S25A Sprut-SD*

CARTRIDGE		PROJECTILE + CARTRIDGE CASE ASSEMBLY		CARTRIDGE CASE ASSEMBLY	
abbreviation	*3ВБМ3*	**abbreviation**	*БМ9 + БМ10*	**abbreviation**	*Ж40*
average weight [*kg*]	*15.66*	**weight [*kg*]**	*9.77*	**type and size of propellant charge**	*15/1 Тр В/А, 12/7 В/А and ВТХ-20*
initial velocity of projectile [*m.s*$^{-1}$]	*1800*	**length [*mm*]**	*517*	**weight of propellant charge [*kg*]**	*5.885*
maximum range (of fire) [*m*]	*4000*	**type of propellant charge**	*15/1 Тр В/А*	**length [*mm*]**	*408*
		weight of propellant charge [*kg*]	*4.10*	**material of cartridge metal part case**	*Fe*
		type of fuze	---	**material of cartridge combustible part case**	*cellulose nitrocellulose TNT*
		material of cartridge combustible case	*cellulose nitrocellulose TNT*	**type of primer**	*ГУВ-7*

PACKING			
Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*50*

DESCRIPTION

3В БМ3 is used for engaging armoured targets, tanks, armoured vehicles. This projectile consists of a windshield (14), body (15), discarding sabots (16), propellant charge (18), stabilizer fins (21) and tracer (20).

COLOR and MARKING	
Body colour:	*Grey*
Text colour:	*Black*

FUZE	
Type	**Characteristic**
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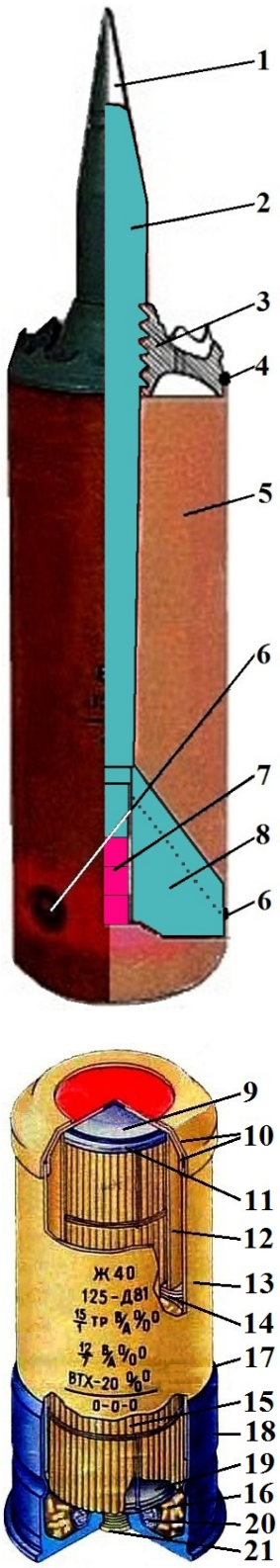
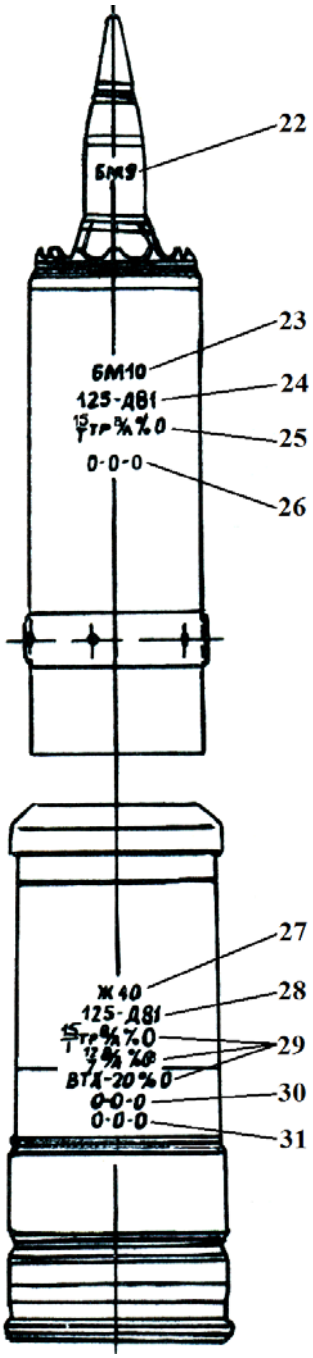
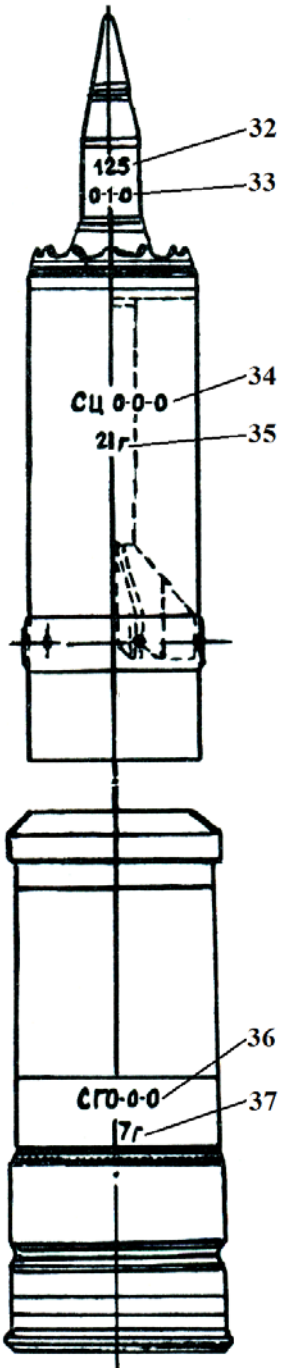
SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

The body is made from hardened steel. The cartridge metal case is made of steel - surface protection zinc.

DRAWINGS/CUTAWAY/STENCILING			LEGEND
			*1 - Windshield; 2 - Body; 3 - Discarding Sabots; 4 - Sealing ring; 5 - Propellant charge; 6 - Centring pins; 7 - Tracer; 8 - Stabilizer fins; 9 - Decoppering agent; 10 - Covers; 11 - Upper igniter; 12 - Distance tube; 13 - Cartridge combustible case; 14 - Cardboard rings; 15 - Tubular propellant; 16 - Seven-perforated propellant; 17 -Sealant; 18 - Cartridge metal case; 19 - Bottom igniter; 20 - Damping propellant; 21 - Primer; 22 - Type of projectile; 23 - Marking of cartridge case assembly; 24 - Marking of weapon; 25 - Marking of powders (type, shape, dimension) and index of manufacturer; 26 - Index filling factory - series - year manufacture a cartridge case assembly; 27 - Marking of cartridge case assembly; 28 - Marking of weapon; 29 - Marking of powders (type, shape, dimension) and index of manufacturer; 30 - Index filling factory - series - year manufacture a cartridge case assembly; 31 - Index completing factory - series - year completing a cartridge case assembly; 32 - Calibre; 33 - Index manufacturer - series - year manufacture a projectile; 34 - Index manufacturer - series - year manufacture a cartridge combustible case assembly; 35 - Weight added propellant; 36 - Index manufacturer - series - year manufacture a cartridge half combustible case assembly; 37 - Weight added propellant.*

	FWP Ammunition	**ANNEX C-66**

FIELD of AMMUNITION	*artillery*
CALIBER	*125 mm*
NAME	*125 mm Separate Cartridge Armour Piercing, Fin Stabilized, Discarding Sabot- Tracer*
TYPE	*APFSDS-T*
NAME/ASSIGNED MARK (original)	*3ВБМ6*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 125 mm tank gun 2A45 (tank T64), 125 mm tank gun 2A46 (D81 tank T64A), 125 mm tank gun 2A46M (D81M -tank T72), 125 mm tank gun 2A46M1 (tank T80 and T90), 125 mm anti-tank gun 2A45 Sprut-A, 125 mm anti-tank gun 2A45M Sprut-B 125 mm self-propelled anti-tank gun 2S25A Sprut-SD*

CARTRIDGE		PROJECTILE + CARTRIDGE CASE ASSEMBLY		CARTRIDGE CASE ASSEMBLY	
abbreviation	*3ВБМ6*	**abbreviation**	*БМ12+ БМ10*	**abbreviation**	*Ж40*
average weight [*kg*]	*15.66*	**weight [*kg*]**	*9.77*	**type and size of propellant charge**	*15/1 Тр В/А, 12/7 В/А and ВТХ-20*
initial velocity of projectile [$m.s^{-1}$]	*1800*	**length [*mm*]**	*517*	**weight of propellant charge [*kg*]**	*5.885*
maximum range (of fire) [*m*]	*4000*	**type of propellant charge**	*15/1 Тр В/А*	**length [*mm*]**	*408*
		weight of propellant charge [*kg*]	*4.10*	**material of cartridge metal part case**	*Fe*
		type of fuze	---	**material of cartridge combustible part case**	*cellulose nitrocellulose TNT*
		material of cartridge combustible case	*cellulose nitrocellulose TNT*	**type of primer**	*ГУВ-7*

PACKING			
Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*50*

DESCRIPTION

3ВБМ6 is used for engaging armoured targets, tanks, and armoured vehicles. This projectile consists of a windshield (14), body (22), Makarov's cap (21), core (23), discarding sabots (15), propellant charge (17), stabilizer fins (19) and tracer (18).

COLOR and MARKING	
Body colour:	*Grey*
Text colour:	*Black*

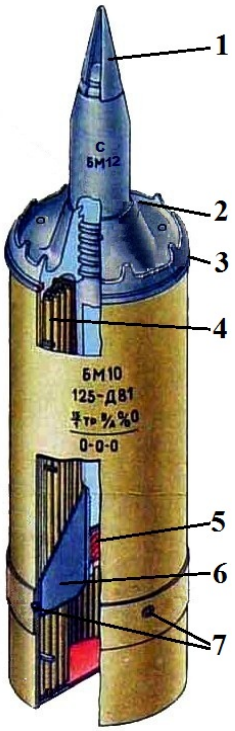
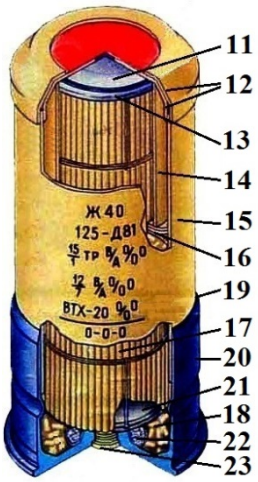
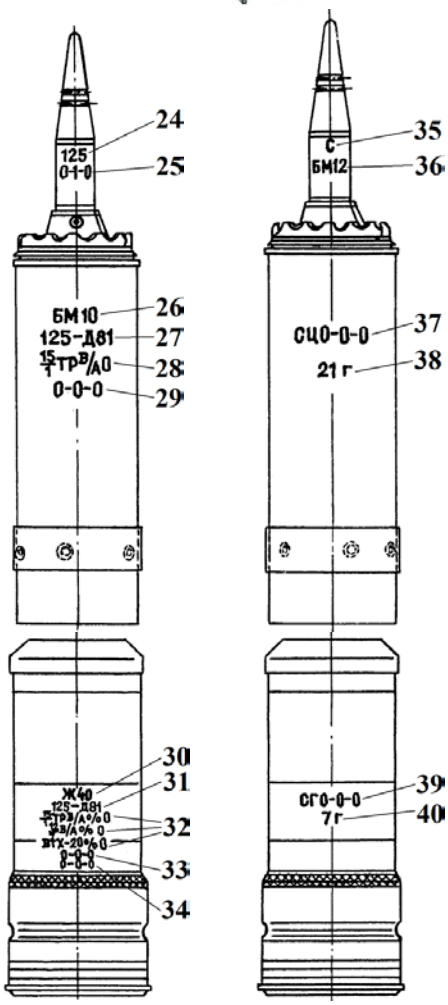
FUZE	
Type: ---	**Characteristic: ---**

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

The body and core are made from hardened steel. The cartridge metal case is made of steel - surface protection zinc.

DRAWINGS/CUTAWAY/STENCILING		LEGEND
 	 	*1 - Windshield;* *2 - Discarding Sabots;* *3 - Sealing ring;* *4 - Propellant charge;* *5 - Tracer; 6 - Stabilizer fins;* *7 - centring pins;* *8 - Makarov's cap;* *9 - Body; 10 - Core;* *11 - Decoppering agent;* *12 - Covers; 13 - Upper igniter;* *14 - Distance tube;* *15 - Cartridge combustible case;* *16 - Cardboard rings;* *17 - Tubular propellant;* *18 - Seven-perforated propellant;* *19 -Sealant;* *20 - Cartridge metal case;* *21 - Bottom igniter;* *22 - Damping propellant;* *23 - Primer;* *24 - Calibre;* *25 - Index manufacturer - series - year manufacture a projectile;* *26 - Marking of cartridge case assembly;* *27 - Marking of weapon;* *28 - Marking of powders (type, shape, dimension) and index of manufacturer;* *29 - Index filling factory - series - year manufacture a cartridge case assembly;* *30 - Marking of cartridge case assembly;* *31 - Marking of weapon;* *32 - Marking of powders (type, shape, dimension) and index of manufacturer;* *33 - Index filling factory - series - year manufacture a cartridge case assembly;* *34 - Index completing factory - series - year completing a cartridge case assembly;* *35 - Type of core;* *36 - Type of projectile;* *37 - Index manufacturer - series - year manufacture a cartridge combustible case assembly;* *38 - Weight added propellant* *39 - Index manufacturer - series - year manufacture a cartridge half combustible case assembly;* *40 - Weight added propellant.*

FWP Ammunition

ANNEX C-67

FIELD of AMMUNITION	*artillery*
CALIBER	*125 mm*
NAME	*125 mm Separate Cartridge High explosive Anti- with Tracer*
TYPE	*HEAT-FS*
NAME/ASSIGNED MARK (original)	*3ВБК10*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 125 mm tank gun 2A45 (tank T64), 125 mm tank gun 2A46 (D81 tank T64A), 125 mm tank gun 2A46M (D81M -tank T72), 125 mm tank gun 2A46M1 (tank T80 and T90), 125 mm anti-tank gun 2A45 Sprut-A, 125 mm anti-tank gun 2A45M Sprut-B 125 mm self-propelled anti-tank gun 2S25A Sprut-SD*

CARTRIDGE	
abbreviation	*3ВБК10*
average weight [*kg*]	*24.89*
initial velocity of projectile [$m.s^{-1}$]	*905*
maximum range (of fire) [*m*]	*4000*

PROJECTILE	
abbreviation	*3БК14М*
weight [*kg*]	*19.00*
length [*mm*]	*677*
type of explosives	*ОКФОЛ А-IX-1*
weight of bursting charge [*kg*]	*1.624*
type of fuze	*B-15*

CARTRIDGE CASE ASSEMBLY	
abbreviation	*Ж40*
type and size of propellant charge	*15/1 Тр В/А, 12/7 В/А and ВТХ-20*
weight of propellant charge [*kg*]	*5.885*
length [*mm*]	*408*
material of cartridge metal part case	*Fe*
material of cartridge combustible part case	*cellulose nitrocellulose TNT*
type of primer	*ГУВ-7*

PACKING

Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*55*

DESCRIPTION

3ВБК10 is used for engaging tanks, armoured vehicles, and reinforced concrete objects. This projectile consists of a fuze (14, 23), cumulative metal insert (18), body of projectile (19), distance component (16); explosive charge (21), stabilizer (24), fins (25) and tracer (26).

COLOR and MARKING

Body colour:	*Grey*
Text colour:	*Black*

FUZE

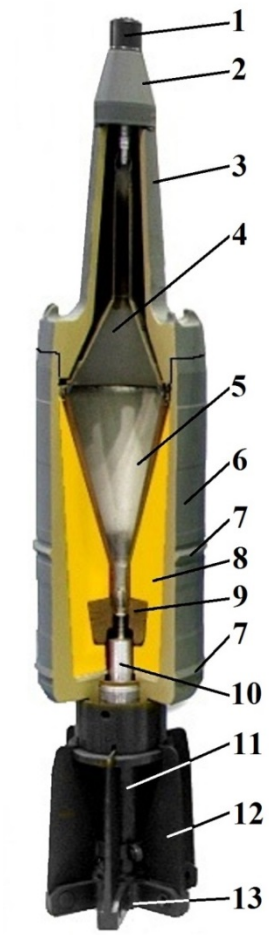
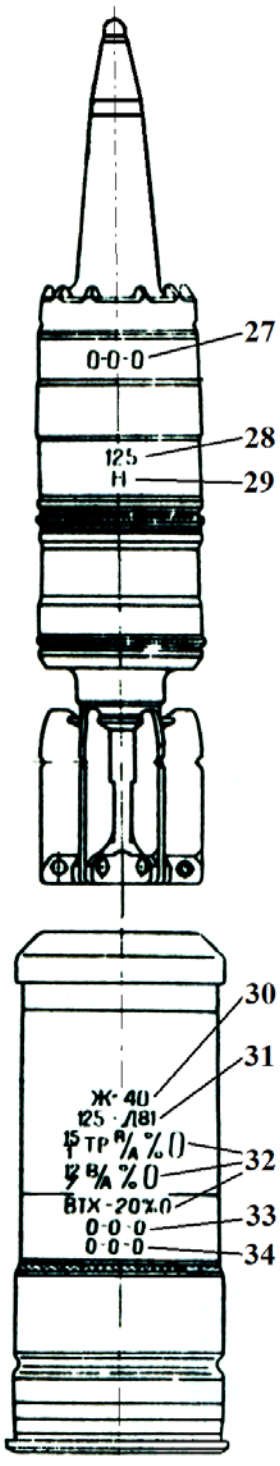
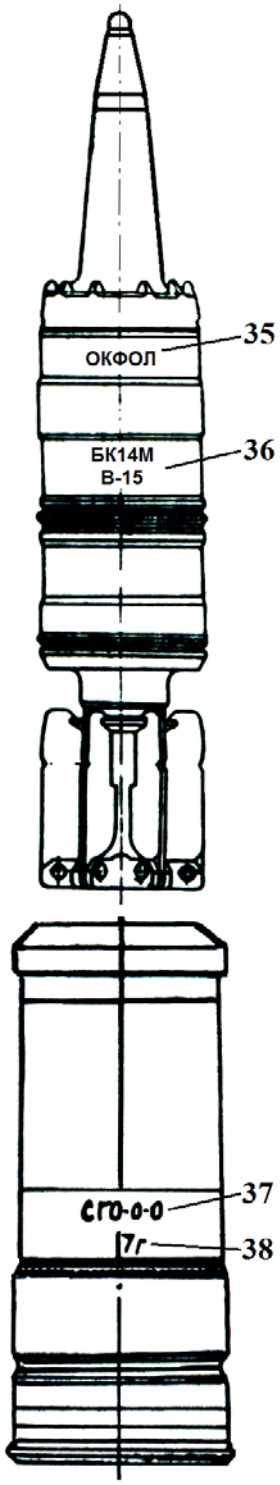
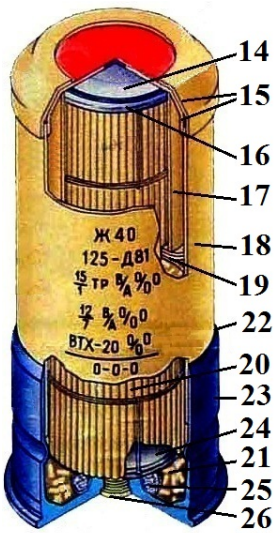
Type	Characteristic
B-15	*Fuze – two piece point initiating base detonating, impact, electrical, secured with masking safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

The cartridge metal case is made of steel - surface protection zinc.

DRAWINGS/CUTAWAY/STENCILING			LEGEND
			*1 - Fuze - nose part;* *2 - Adjusting nut;* *3 - Distance component;* *4 - Negative conical cap - rectifier cone;* *5 - Cumulative metal insert;* *6 - Body;* *7 - Sealing rings;* *8 - Explosive charge;* *9 - Insert;* *10 - Fuze - bottom part;* *11 - Stabilizer;* *12 - Fins of stabilizer;* *13 - Tracer;* *14 - Decoppering agent;* *15 - Covers;* *16 - Upper igniter;* *17 - Distance tube;* *18 - Cartridge combustible case; 19 - Cardboard rings;* *20 - Tubular propellant;* *21 - Seven-perforated propellant; 22 -Sealant;* *23 - Cartridge metal case;* *24 - Bottom igniter;* *25 - Damping propellant;* *26 - Primer;* *27 - Index manufacturer - series - year manufacture a projectile;* *28 - Calibre;* *29 - Weight sign;* *30 - Marking of cartridge case assembly;* *31 - Marking of weapon;* *32 - Marking of powders (type, shape, dimension) and index of manufacturer;* *33 - Index filling factory - series - year manufacture a cartridge case assembly;* *34 - Index completing factory - series - year completing a cartridge case assembly; 35 - Type of explosive; 36 - Type of projectile and type of fuze;* *37 - Index manufacturer - series - year manufacture a cartridge half combustible case assembly;* *38 - Weight added propellant.*
			

FWP Ammunition

ANNEX C-68

FIELD of AMMUNITION	*artillery*
CALIBER	*152 mm*
NAME	*152 mm Separate Cartridge High Explosive - Fragmentation with Full Bag Charge No. P, 2-4*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*152-EOF-KH 37 P (old)*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 152 mm gun-howitzer M1937 (152 KH 37), 152 mm gun-howitzer D-20 (152 KH D-20) and 152 mm howitzer M1918/1947 (152 H 18/47)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*152-EOF-KH 37 P*	**abbreviation**	*T-OF-152*	**abbreviation**	*Nk-P, 2, 4 152 KH 37, H 18/47*
average weight [*kg*]	*59.4*	**weight [*kg*]**	*43.5*	**type and size of propellant charge**	*(4) Ngtp 6x1.9/320-9.0+ (2) Ngpp 1/10/320-KV + (P) Ngtp 6x1.9/120-9.0*
		length [*mm*]	*710-716*		
initial velocity of projectile [$m.s^{-1}$]	*578 - charge 2 502 - charge 4*	**type of explosives**	*TNT*		
		weight of blasting filler [*kg*]	*6.151 (compressed - threading TNT); 6.48 (molten TNT)*	**weight of propellant charge [*kg*]**	*7.70 (4)=5.66; (2)=1.02; (P)=1.02*
maximum range (of fire) [*m*]	*15180 - charge 2 13160 - charge 4*			**weight of decoppering agent [*kg*]**	*0.060*
		type of fuze	*nz 10, nz 10a, nz 10av, nz 10bv, nz 11, nz 11M, RGM-2, V-90*	**weight of cartridge case [*kg*]**	*Ms - 7.50 Fe - 7.73*
				length [*mm*]	*545*
				material of cartridge case	*Ms (brass) Fe (steel)*
				type of primer	*vz. 46M, vz. 49M, KV-4*

PACKING

Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*75*

DESCRIPTION

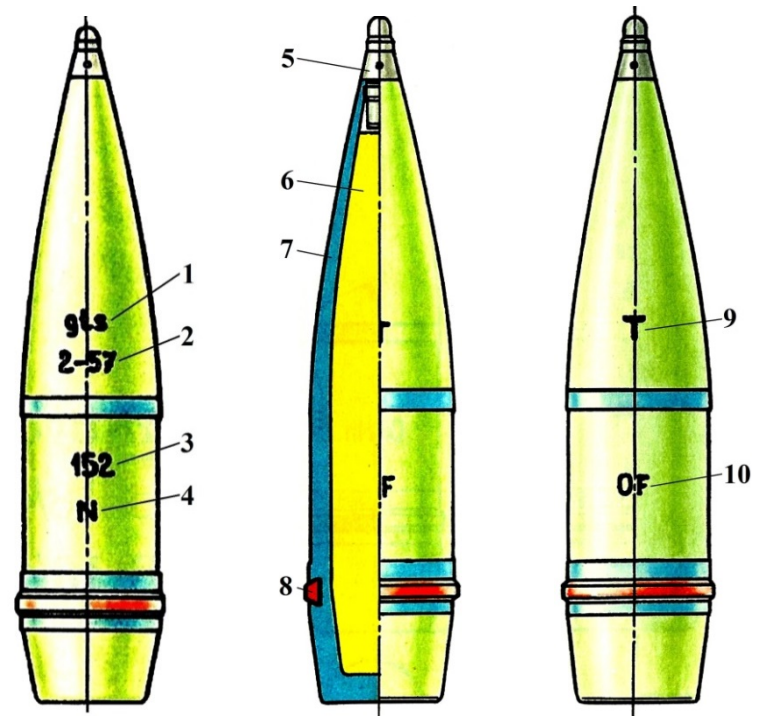
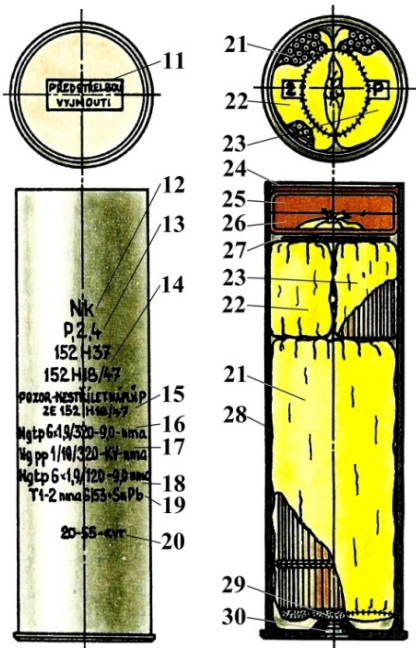
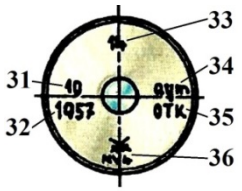
152 EOF is used for the destruction of enemy artillery, fortified shelters and building. This projectile consists of a body (23), explosive charge (22), fuze (21) and driving band (24).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
nz 10, nz 10a, nz 10av, nz 10bv,nz 11, nz 11M, RGM-2, V-90	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. The fuze has an adjustable delay, secured detonator, and provides muzzle safety.*

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Fuze;* *6 - Explosive charge;* *7 - Body;* *8 - Driving band* *9 - Type of explosive;* *10 - Type of projectile - "OF"* *11 - The label with the inscription "Before shooting remove";* *12 - Marking of cartridge case assembly;* *13 - Marking of type of bags charge;* *14 - Marking of weapon;* *15 - Note that charge "P" is not used in the 152-H-18/47;* *16, 17, 18 - Marking of powder (type, shape, dimension) and Manufacturer, series, year of manufacture of powder;* *19 - Type of black powder in igniter and series, year of manufacture of black powder and type of decoppering agent;* *20 - Series-year of production and symbol of filling factory;* *21 - Charge number "4";* *22 - Charge number "2";* *23 - Charge number "P";* *24 - Seal of cartridge case;* *25 - Reinforced upper cover;* *26 - Normal bottom cover;* *27 - Decoppering agent;* *28 - Cartridge case;* *29 - Igniter;* *30 - Primer;* *31, 32 - Series and year of manufacture of cartridge;* *33 - Number of melt;* *34 - Symbol of manufacturer;* *35 - Symbol of control;* *36 - Symbol of inspection.*
	**BOTTOM of cartridge case** 

SAFETY CONSIDERATION THREAT
Do not touch and do not move unexploded projectile.

NOTICE
Driving band is made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. When a steel cartridge case was used it may be spiral wrapped wound or forged.

	FWP Ammunition	**ANNEX C-69**

FIELD of AMMUNITION	*artillery*
CALIBER	*152 mm*
NAME	*152 mm Separate Cartridge High Explosive - Fragmentation with Full Bag Charge No. P, 1-5*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*152-EOF-KH 37 P (new)*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 152 mm gun-howitzer M1937 (152 KH 37), 152 mm gun-howitzer D-20 (152 KH D-20) and 152 mm howitzer M1918/1947 (152 H 18/47)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*152-EOF--KH 37 P*	**abbreviation**	*T-OF-152*	**abbreviation**	*Nk 152 KH 37*
average weight [*kg*]	*58.9*	**weight [*kg*]**	*43.5*	**type and size of propellant charge** *(No. of bag charge)*	*(5) Ngtp 5.7x1.7/290-8.5 + (4) Ngtp 5.7x1.7/185-8.5 + (3)Dgtp 6x1.8/290-8.5 + (2) Dgtp 6x1.8/175-8.5 + (1) Ngtp 4.8x1.65/290-7.85-(NDT-3) + (P) Ngtp 4.8x1.65/175-7.85-(NDT-3)*
initial velocity of projectile [$m.s^{-1}$]	*578 - charge 2* *502 - charge 4*	**length [*mm*]**	*710-716*		
maximum range (of fire) [*m*]	*15180 - charge 2* *13160 - charge 4*	**type of explosives**	*TNT*		
		weight of blasting filler [*kg*]	*6.151*	**weight of propellant charge [*kg*]**	*7.27* *(5)=5.10; (4)=2x0.31; (3)=2x0.31; (2)=0.31; (1)=0.31; (P)=0.31*
		type of fuze	*nz 10bv, nz 11, RGM-2, V-90*	**weight of cartridge case [*kg*]**	*Ms - 7.50* *Fe - 7.73*
				length [*mm*]	*545*
				material of cartridge case	*Ms (brass)* *Fe (steel)*
				type of primer	*KV-4*
				weight of decoppering agent [*kg*]	*0.050*

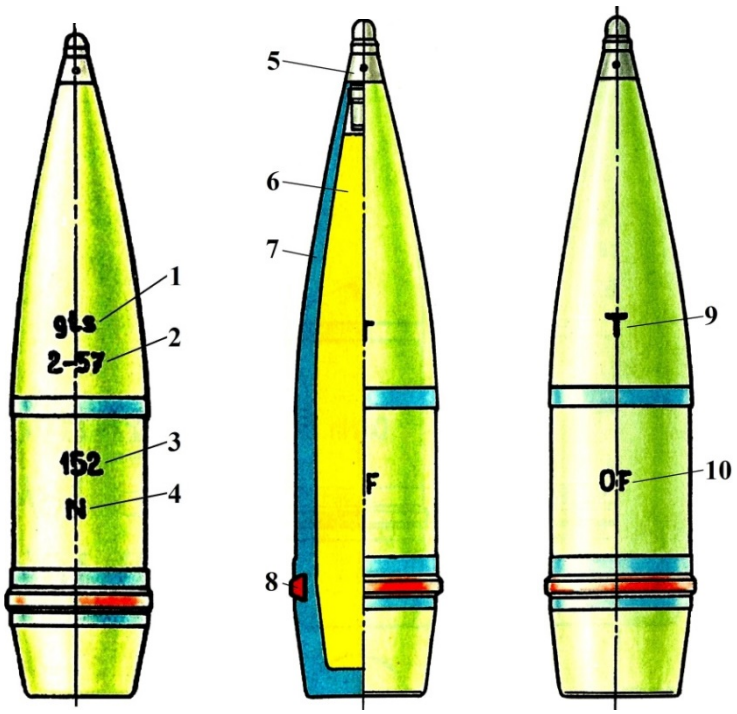
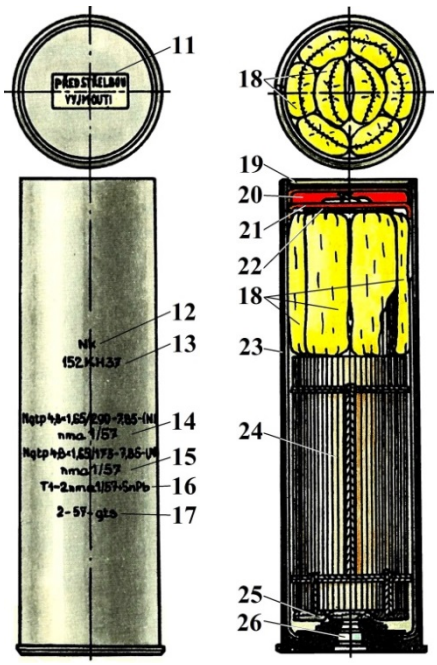
PACKING			
Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*75*

DESCRIPTION

152 EOF is used for the destruction of enemy artillery, fortified shelters and buildings. This projectile consists of a body (19), explosive charge (18), fuze (17) and driving band (20).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

FUZE	
Type	**Characteristic**
nz 10bv, nz 11, RGM-2, V-90	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. The fuze has an adjustable delay, secured detonator, and provides muzzle safety.*

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Fuze;* *6 - Explosive charge;* *7 - Body;* *8 - Driving band* *9 - Type of explosive;* *10 - Type of shot - "OF"* *11 - The label with the inscription "Before shooting remove";* *12 - Marking of cartridge case assembly;* *13 - Marking of weapon;* *14, 15 - Marking of powder (type, shape, dimension) and Manufacturer, series, year of manufacture of powder;* *16 - Type of black powder in igniter and series, year of manufacture of black powder and type of decoppering agent;* *17 - Series-year of production and symbol of filling factory;* *18 - Partial Bag Charges - No. "P" to "4";* *19 - Seal of cartridge case;* *20 - Reinforced cover (upper);* *21 - Normal cover (bottom);* *22 - Decoppering agent;* *23 - Cartridge case;* *24 - Basic charge - No. "5"* *25 - Igniter;* *26 - Primer;* *27, 28 - Series and year of manufacture of cartridge;* *29 - Number of melt;* *30 - Symbol of manufacturer;* *31 - Symbol of control;* *32 - Symbol of inspection.*
	**BOTTOM of cartridge case**

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Driving band is made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. When a steel cartridge case was used it may be spiral wrapped wound or forged.

	FWP Ammunition	ANNEX C-70

FIELD of AMMUNITION	*artillery*
CALIBER	*152 mm*
NAME	*152 mm Separate Cartridge High Explosive - Fragmentation with Full Bag Charge No. P, 1-5*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*ВОФ-545*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *152 mm gun-howitzer M1937 (152 KH 37),* *152 mm gun-howitzer D-20 (152 KH D-20)* *and 152 mm howitzer M1918/1947 (152 H 18/47)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*ВОФ-545*	**abbreviation**	*ОФ-540, ОФ-540Ж*	**abbreviation**	*Ж-545 (ЖН-545, ЖД-545)*
average weight [*kg*]	*59.4*	**weight [*kg*]**	*43.56*	**type and size of propellant charge**	*НДТ-3-16/1 + ВДТ25; ДГ-3-16/1+ВДТ25*
		length [*mm*]	*710*		
initial velocity of projectile [$m.s^{-1}$]	*578 - charge 2* *502 - charge 4*	**type of explosives**	*TNT*		
		weight of blasting filler [*kg*]	*5.86*	**weight of propellant charge [*kg*]**	*7.56*
maximum range (of fire) [*m*]	*15180 - charge 2* *13160 - charge 4*	**type of fuze**	*ПГМ-2, В-90, Д-1-У*	**material of cartridge case**	*Ms (brass)* *Fe (steel)*
				length [*mm*]	*545*
				weight of cartridge case [*kg*]	*Ms - 6.35* *Fe - 7.73*
				type of primer	*КВ-4*

PACKING

Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*81*

DESCRIPTION

ВОФ-545 is used for the destruction of enemy artillery, fortified shelters and buildings. This projectile consists of a body (6), explosive charge (7), fuze (1) and driving band (8).

COLOR and MARKING

Body colour:	*Olive*	**Text colour:**	*Black*

FUZE

Type	Characteristic
ПГМ-2, В-90, Д-1-У	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. F The fuze has an adjustable delay, secured detonator, and provides muzzle safety.*

SAFETY CONSIDERATION THREAT

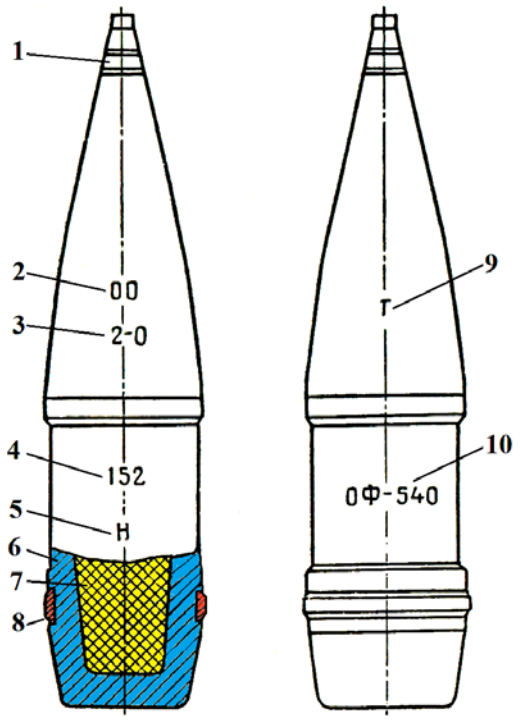
Do not touch and do not move unexploded projectile.

NOTICE

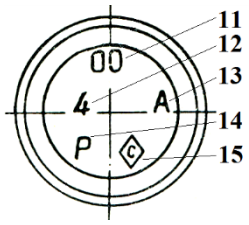
*Driving band is made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. Marking of projectile ОФ540**Ж** means that the driving band is made of FeS alloy.*

DRAWINGS/CUTAWAY/MARKING/STENCILING

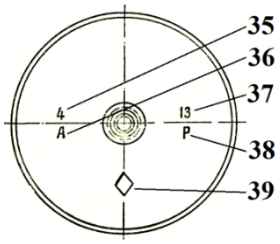
PROJECTILE



BOTTOM of the projectile

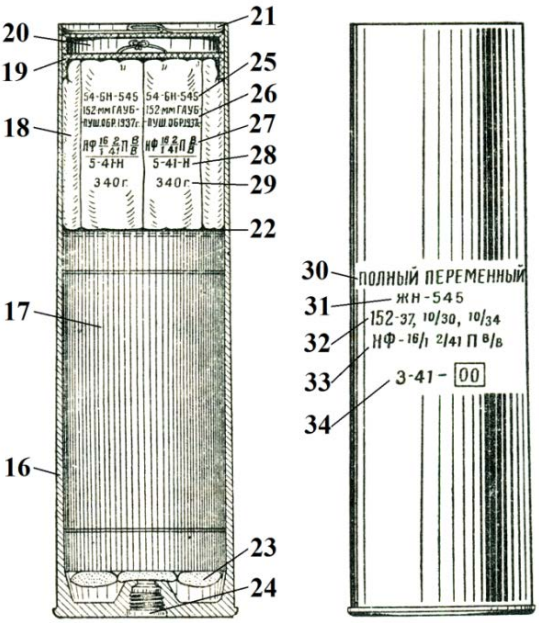


BOTTOM of the cartridge case



CARTRIDGE CASE ASSEMBLY

Ж-545У



LEGEND

1 - Fuze;
2 - Symbol of filling factory;
3 - Series and year of manufacture;
4 - Calibre;5 - Weight sign;
6 - Body; 7 - Explosive charge;
8 - Driving band;9 - Type of explosives;
10 - Type of projectile - "ОФ-540";
11 - Number of manufacturer of body;
12 - Series of manufacture;
13 - Code of filling factory;
14 - Symbol of control;
15 - Symbol of inspection;
16 - Cartridge case;
17 - Basic charge;
18 - Partial charges;
19 - Lower cover - normal;
20 - Upper cover - reinforced;
21 - Hermetic closure;
22 - Decoppering agent;
23 - Igniter;
24 - Primer;
25 - Marking of partial charges;
26 - Type of weapon;
27 - Marking of powder (type, shape) and series/ year of manufacture and code of manufacturer of powder;
28 - Series and year manufacture of propellant charge and code of filling factory;
29 - Weight of propellant;
30 - Type of cartridge case assembly;
31 - Index of type of cartridge case assembly;
32 - Calibre and type of weapon;
33 - Marking of powder (type, shape) and series/ year of manufacture and code of manufacturer;
34 - Series and year manufacture of cartridge case assembly and code of filling factory;
35, 36 - Series and code of year manufacture cartridge case;
37 - Code of manufacturer of cartridge case;
38 - Symbol of control;
39 - Symbol of inspection.

FWP Ammunition

ANNEX C-71

FIELD of AMMUNITION	*artillery*
CALIBER	*152 mm*
NAME	*152 mm Separate Cartridge High Explosive - Fragmentation with Reduced Bag Charge No. 6-12*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*152-EOF-KH 37 Zm or 152-EOF-mn-KH 37, H 18/47*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 152 mm gun-howitzer M1937 (152 KH 37), 152 mm gun-howitzer D-20 (152 KH D-20), 152 mm howitzer M1918/1947 (152 H 18/47)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*152-EOF--KH 37 P*	**abbreviation**	*T-OF-152*	**abbreviation**	*Nkm-6,8,10,12 152 KH 37, H 18/47*
average weight [*kg*]	*54.1*	**weight [*kg*]**	*43.5*	**type and size of propellant charge**	*(12) Ngtp 4x0.5/320-9.0 (10) Ngpp 0.8/8/210 vz. 36 (8) Ngpp 0.8/8/210 vz. 36 (6) Ngpp 0.8/8/210 vz. 36*
		length [*mm*]	*710-716*		
initial velocity of projectile [$m.s^{-1}$]	*420 - charge 6 332 - charge 10*	**type of explosives**	*TNT*		
maximum range (of fire) [*m*]	*11000 - charge 6 8880 - charge 10*	**weight of blasting filler [*kg*]**	*6.151 (compressed - threading TNT); 6.48 (molten TNT)*	**weight of propellant charge [*kg*]**	*2.73 (12)=1.35; (10)=0.46; (8)=1.46; (6)=0.46*
				weight of cartridge case [*kg*]	*Ms - 7.50 Fe - 7.73*
		type of fuze	*nz 10av, nz 10bv, nz 11, nz 11M, RGM-2, V-90*	**length [*mm*]**	*545*
				material of cartridge case	*Ms (brass) Fe (steel)*
				type of primer	*KV-4*
				weight of decoppering agent [*kg*]	*0.030*

PACKING

Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*71*

DESCRIPTION

152 EOF is used for the destruction of enemy artillery, fortified shelters, and buildings. This projectile consists of a body (19), explosive charge (18), fuze (21) and driving band (20).

COLOR and MARKING

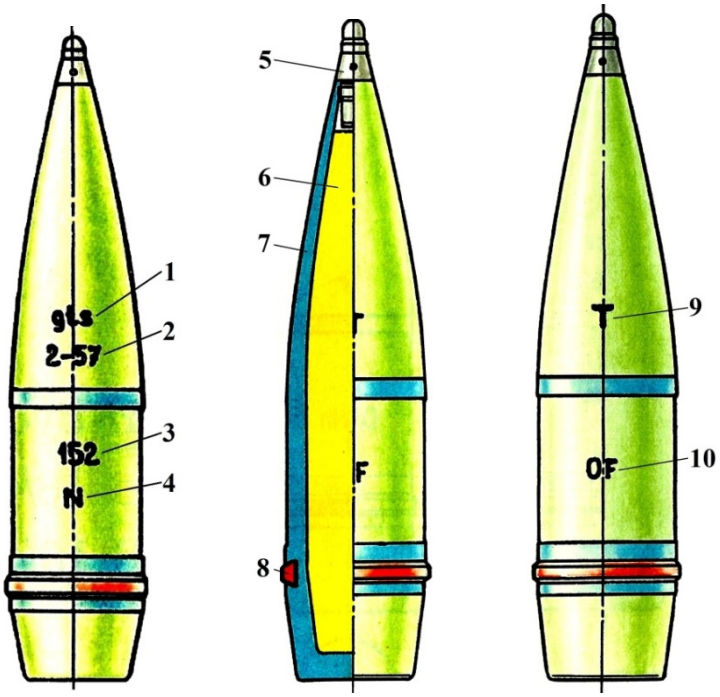
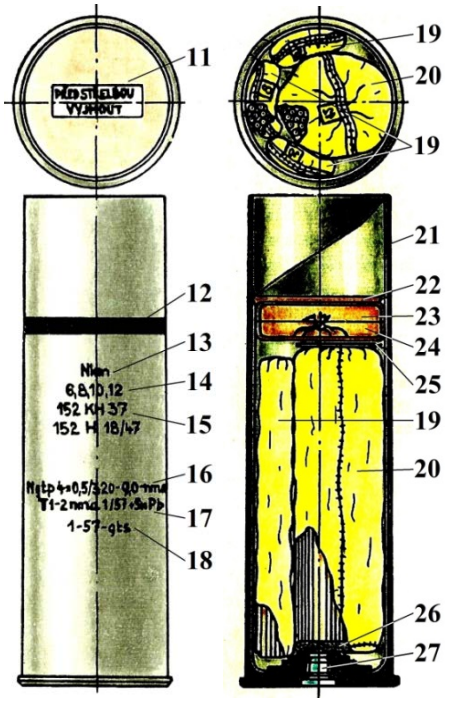
Body colour:	*Olive*	**Text colour:**	*Black*

FUZE

Type	Characteristic
nz 10av, nz 10bv, nz 11, nz 11M, RGM-2, V-90	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. The fuze has an adjustable delay, secured detonator, and provides muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Fuze;* *6 - Explosive charge;* *7 - Body;* *8 - Driving band* *9 - Type of explosive;* *10 - Type of projectile - "OF"* *11 - The label with the inscription "Before shooting remove";* *12 - Graphic marking of cartridge - black stripe;* *13 - Marking of cartridge;* *14 - Marking of type of bags charge;* *15 - Marking of weapon;* *16 - Marking of powder (type, shape, dimension) and Manufacturer, series, year of manufacture of powder;* *17 - Type of black powder in igniter and series, year of manufacture of black powder and type of decoppering agent;* *18 - Series-year of production and symbol of filling factory;* *19 - Partial Bag Charges - No. "6", "8" and "10"* *20 - Partial Bag Charge - No. "12"* *21 - Cartridge case (wound);* *22 - Seal of cartridge case;* *23 - Reinforced cover (upper);* *24 - Normal cover (bottom);* *25 - Decoppering agent;* *26 - Igniter;* *27 - Primer;* *28, 29 - Series and year of manufacture of cartridge;* *30 - Number of melt;* *31 - Symbol of manufacturer;* *32 - Symbol of control;* *33 - Symbol of inspection.*
	**BOTTOM of cartridge case**

NOTICE

Driving band were made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. When a steel cartridge case was used it may be spiral wrapped wound or forged.

FWP Ammunition

ANNEX C-72

FIELD of AMMUNITION	*artillery*
CALIBER	*152 mm*
NAME	*152 mm Separate Cartridge High Explosive - Fragmentation with Reduced Bag Charge No. 6-12*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*ВОФ-545У*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by 152 mm gun-howitzer M1937 (152 KH 37), 152 mm gun-howitzer D-20 (152 KH D-20) and 152 mm howitzer M1918/1947 (152 H 18/47)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*ВОФ-545У*	**abbreviation**	*ОФ-540, ОФ-540Ж*	**abbreviation**	*Ж-545У (ЖН-545У)*
average weight [*kg*]	*54.1*	**weight [*kg*]**	*43.56*	**type and size of propellant charge**	*4/1+7/7 4/1+7/7ОД*
		length [*mm*]	*710*		
initial velocity of projectile [$m.s^{-1}$]	*420 - charge 6 332 - charge 10*	**type of explosives**	*TNT*		
		weight of blasting filler [*kg*]	*5.86*	**weight of propellant charge [*kg*]**	*2.92*
maximum range (of fire) [*m*]	*11000- charge 6 8880 - charge 10*	**type of fuze**	*ПГМ-2, В-90, Д-1-У*	**material of cartridge case**	*Ms (brass) Fe (steel)*
				length [*mm*]	*348*
				weight of cartridge case [*kg*]	*Ms - 7.50 Fe - 6.35*
				type of primer	*КВ-4*

PACKING

Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*76*

DESCRIPTION

ВОФ-545У is used for the destruction of enemy artillery, fortified shelters, buildings. This projectile consists of a body (6), explosive charge (7), fuze (1) and driving band (8).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
ПГМ-2, В-90, Д-1-У	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. The fuze has an adjustable delay, secured detonator, and provides muzzle safety.*

SAFETY CONSIDERATION THREAT

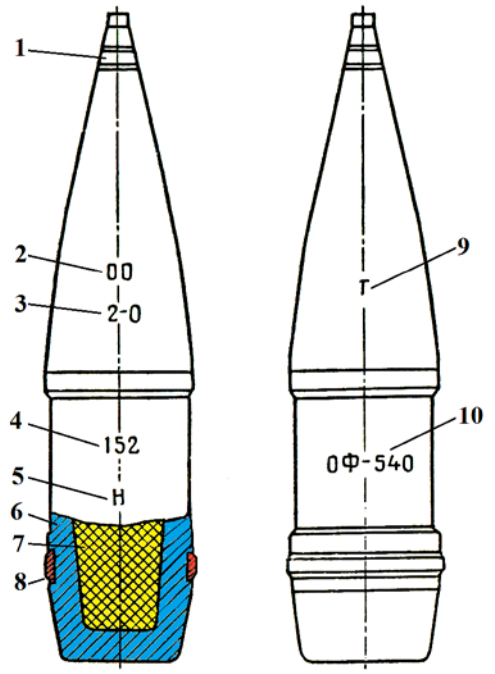
Do not touch and do not move unexploded projectile.

NOTICE

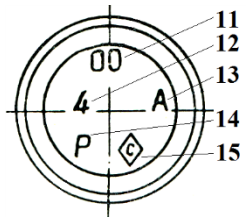
*Driving band were made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band.Marking of projectile ОФ540**Ж** means that the driving band is made of FeS alloy.*

DRAWINGS/CUTAWAY/MARKING/STENCILING

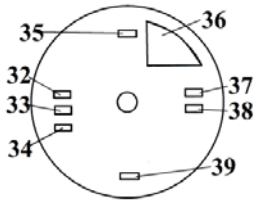
PROJECTILE



BOTTOM of the projectile

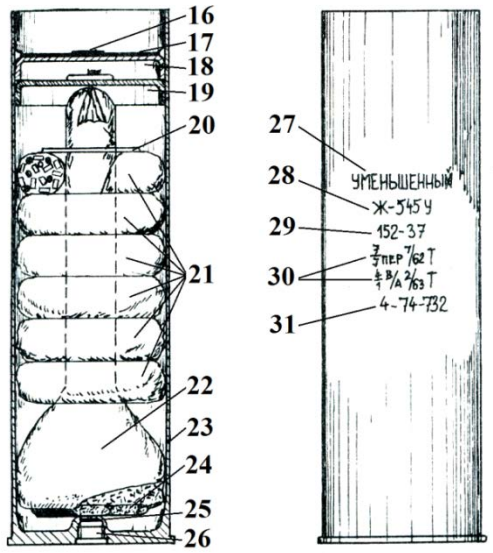


BOTTOM of the cartridge case



CARTRIDGE CASE ASSEMBLY

Ж-545У



LEGEND

1 - Fuze;
2 - Symbol of filling factory;
3 - Series and year of manufacture;
4 - Calibre;
5 - Weight sign;
6 - Body;
7 - Explosive charge;
8 - Driving band;
9 - Type of explosives;
10 - Type of projectile - "ОФ-540";
11 - Number of manufacturer of body;
12, 13 - Series and code of filling factory;
14 - Symbol of control;
15 - Symbol of inspection
16 -Tab; 17 - Hermetic closure;
18 - Upper cover - reinforced;
19 - Lower cover - normal;
20 - Decoppering agent;
21 - Partial charges;
22 - Basic charge; 23 - Cartridge case; 24 - Igniter;
25 - Label of propellant data;
26 - Primer;
27 - Type of cartridge case with reduced bag charge = "УМЕНЬШЕННЫЙ";
28 - Index of cartridge case assembly;
29 - Calibre and type of weapon;
30 - Marking of powder (type, shape) and series/ year of manufacture and Code of manufacturer of powder;
31 - Series and year manufacture of cartridge and code of filling factory;
32, 33 - Series and year of cartridge case manufacture;
34 - Number of calibration;
35 - Number of melt;
36 - Place for the manufacture marks
37 - Code of manufacturer of cartridge case;
38 - Symbol of control;
39 - Symbol of inspection.

	FWP Ammunition	**ANNEX C-73**

FIELD of AMMUNITION	*artillery*
CALIBER	*152 mm*
NAME	*152 mm Separate Cartridge High Explosive - Fragmentation Practice. with Full Bag Charge No. P, 2-4*
TYPE	*HE-FRAG Practice*
NAME/ASSIGNED MARK (original)	*152-EOFNh-KH 37 P, 2-4*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *152 mm gun-howitzer M1937 (152 KH 37),* *152 mm gun-howitzer D-20 (152 KH D-20)* *and 152 mm howitzer M1918/1947 (152 H 18/47)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*152-EOF-KH 37 P*	**abbreviation**	*OFNh-152*	**abbreviation**	*Nk-P, 2, 4* *152 KH 37, H 18/47*
average weight [*kg*]	*59.4*	**weight [*kg*]**	*43.5*	**type and size of propellant charge**	*(4) Ngtp 6x1.9/320-9.0+(2) Ngpp 1/10/320-KV +(P) Ngtp 6x1.9/120-9.0*
		length [*mm*]	*710-716*		
initial velocity of projectile [$m.s^{-1}$]	*578 - charge 2* *502 - charge 4*	**type of explosives**	---		
		weight of blasting filler [*kg*]	---	**weight of propellant charge [*kg*]**	*7.70* *(4)=5.66; (2)=1.02; (P)=1.02*
maximum range (of fire) [*m*]	*15180 - charge 2* *13160 - charge 4*	**type of fuze**	*dummy fuzes:* *nz 10Nh, nz 10aNh, nz 10avNh, nz 10bvNh, nz 11Nh, nz 11MNh, RGM-2Nh, V-90Nh*	**weight of decoppering agent [*kg*]**	*0.060*
				weight of cartridge case [*kg*]	*Ms - 7.50* *Fe - 7.73*
				length [*mm*]	*545*
				material of cartridge case	*Ms (brass)* *Fe (steel)*
				type of primer	*vz. 46M, vz. 49M, KV-4*

PACKING			
Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*75*

DESCRIPTION

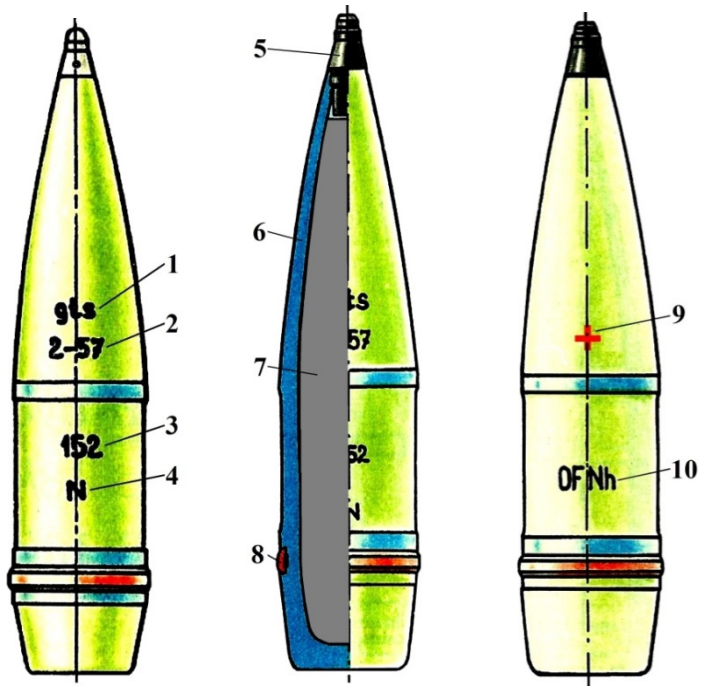
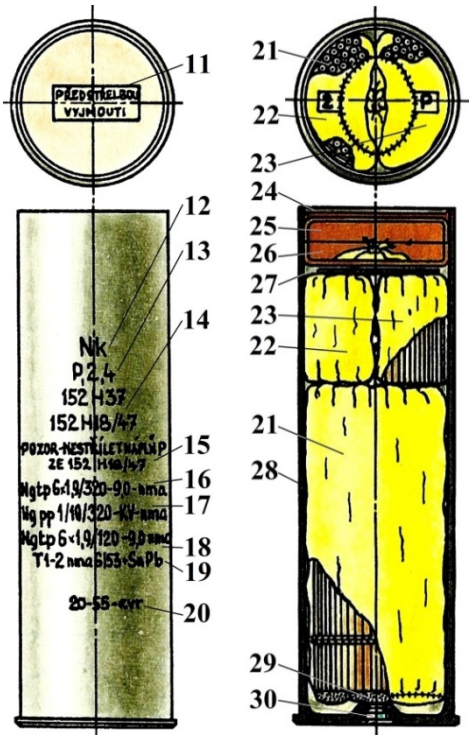
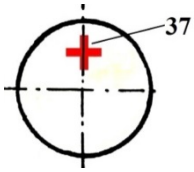
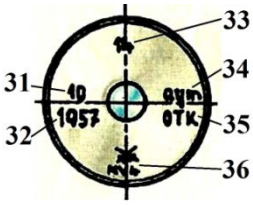
152 EOFNh is used for training and testing the destruction of enemy artillery, fortified shelters, and buildings. This projectile consists of a body (22), inert material (23), dummy fuze (21) and driving band (24).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

FUZE	
Type	**Characteristic**
dummy fuzes	*Fuzes without explosives.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Fuze - dummy;* *6 - Body;* *7 - Inert material;* *8 - Driving band* *9 - Red cross - marking of type projectile;* *10 - Type of projectile - "OFNh"* *11 - The label with the inscription "Before shooting remove";* *12 - Marking of cartridge case assembly;* *13 - Marking of type of bags charge;* *14 - Marking of weapon;* *15 - Note that charge "P" is not fired from the 152-H-18/47;* *16, 17, 18 - Marking of powder (type, shape, dimension) and Manufacturer, series, year of manufacture of powder;* *19 - Type of black powder in igniter and series, year of manufacture of black powder and type of decoppering agent;* *20 - Series-year of production and symbol of filling factory;* *21 - Charge number "4";* *22 - Charge number "2";* *23 - Charge number "P";* *24 - Seal of cartridge case;* *25 - Reinforced upper cover;* *26 - Normal bottom cover;* *27 - Decoppering agent;* *28 - Cartridge case;* *29 - Igniter;* *30 - Primer;* *31, 32 - Series and year of manufacture of cartridge;* *33 - Number of melt;* *34 - Symbol of manufacturer;* *35 - Symbol of control;* *36 - Symbol of inspection;* *37 - Red cross - marking of type projectile.*
	**BOTTOM of projectile**  **BOTTOM of cartridge case** 

NOTICE

Driving band were made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. When a steel cartridge case was used it may be spiral wrapped wound or forged.

FWP Ammunition

ANNEX C-74

FIELD of AMMUNITION	*artillery*
CALIBER	*152 mm*
NAME	*152 mm Separate Cartridge High Explosive - Fragmentation Practice with Reduced Bag Charge No. 6-12*
TYPE	*HE FRAG Practice*
NAME/ASSIGNED MARK (original)	*152-EONh-KH 37*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *152 mm gun-howitzer M1937 (152 KH 37),* *152 mm gun-howitzer D-20 (152 KH D-20)* *and 152 mm howitzer M1918/1947 (152 H 18/47)*

CARTRIDGE		PROJECTILE		CARTRIDGE CASE ASSEMBLY	
abbreviation	*152-EONh-KH 37*	**abbreviation**	*ONh-152*	**abbreviation**	*Nkm-6,8,10,12* *152 KH 37, H 18/47*
average weight [*kg*]	*54.1*	**weight [*kg*]**	*43.5*	**type and size of propellant charge** *(No. of bag charge: 6, 8, 10, 12)*	*(12) Ngtp 4x0.5/320-9.0 +* *(10) Ngpp 0.8/8/210 vz. 36* *(8) Ngpp 0.8/8/210 vz. 36* *(6) Ngpp 0.8/8/210 vz. 36*
		length [*mm*]	*710-716*		
initial velocity of projectile [$m.s^{-1}$]	*425 - charge 6* *282 - charge 10*	**type of explosives**	---		
maximum range (of fire) [*m*]	*11000 - charge 6* *6730 - charge 10*	**weight of blasting filler [*kg*]**	---	**weight of propellant charge [*kg*]**	*2.73* *(12)=1.35; (10)=0.46;* *(8)=1.46; (6)=0.46*
		type of fuze	*Dummy fuzes:* *nz 10avNh,* *nz 10bvNh,* *nz 11Nh,* *nz 11MNh,* *RGM-2Nh,* *V-90Nh*	**weight of cartridge case [*kg*]**	*Ms – 7.50* *Fe - 7.73*
				length [*mm*]	*545*
				material of cartridge case	*Ms (brass)* *Fe (steel)*
				type of primer	*KV-4*
				weight of decoppering agent [*kg*]	*0.030*

PACKING

Number of rounds in the crate	*1*	**Weight of full crate [*kg*]**	*71*

DESCRIPTION

152 EONh is used for training and testing the destruction of enemy artillery, fortified shelters, and buildings This projectile consists of a body (19), inert material (20), dummy fuze (18) and driving band (21).

COLOR and MARKING

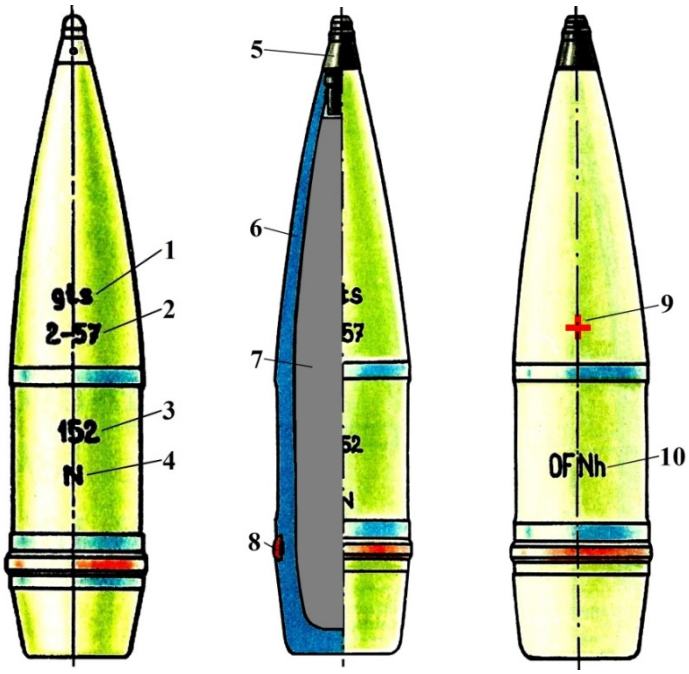
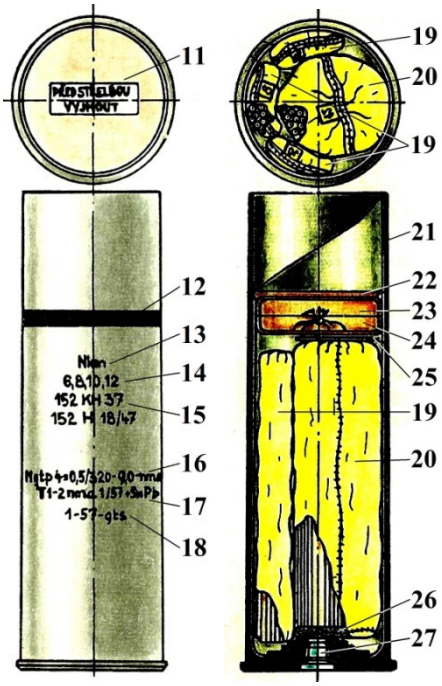
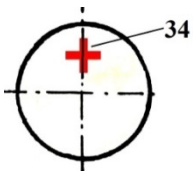
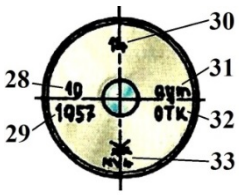
Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
dummy fuzes	*Fuzes without explosives.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Symbol of filling factory;* *2 - Series and year of production of projectile;* *3 - Calibre;* *4 - Weight sign;* *5 - Fuze - dummy;* *6 - Body;* *7 - Inert material;* *8 - Driving band* *9 - Red cross - marking of type projectile;* *10 - Type of projectile - "OFNh"* *11 - The label with the inscription "Before shooting remove";* *12 - Graphic marking of cartridge - black stripe;* *13 - Marking of cartridge;* *14 - Marking of type of bags charge;* *15 - Marking of weapon;* *16 - Marking of powder (type, shape, dimension) and Manufacturer, series, year of manufacture of powder;* *17 - Type of black powder in igniter and series, year of manufacture of black powder and type of decoppering agent;* *18 - Series-year of production and symbol of filling factory;* *19 - Partial Bag Charges - No. "6", "8" and "10"* *20 - Partial Bag Charge - No. "12"* *21 - Cartridge case (wound);* *22 - Seal of cartridge case;* *23 - Reinforced cover (upper);* *24 - Normal cover (bottom);* *25 - Decoppering agent;* *26 - Igniter;* *27 - Primer;* *28, 29 - Series and year of manufacture of cartridge;* *30 - Number of melt;* *31 - Symbol of manufacturer;* *32 - Symbol of control;* *33 - Symbol of inspection;* *34 - Red cross - marking of type projectile.*
	**BOTTOM of projectile**  **BOTTOM of cartridge case** 

NOTICE

Driving band were made from copper or alloy of "FeS". Decoppering agent is not used when fitted with a FeS driving band. When a steel cartridge case was used it may be spiral wrapped wound or forged.

FWP Ammunition

ANNEX C-75

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm High Explosive - Fragmentation - Mortar Bomb*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*82-EO-M 52*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD;	*Fired by* *82 mm Mortar M37, M41, M52* *(82-M-37, 82-M-41, 82-M-52)*

CARTRIDGE		PROJECTILE		CHARGE		
abbreviation	*82-EO-M 52*	**abbreviation**	*82-O-M*	**abbreviation basic charge "BC"**		*20 - vz. 49*
average weight [*kg*]	*3.356*	**weight [*kg*]**	*3.300*			
		length [*mm*]	*325 - 331*	**propellant basic charge**		*Ng dp 0.15/1-12.0*
length [*mm*]	*325 - 331*	**type of explosives**	*TNT*			
initial velocity of projectile (charge No. Z; 6) [$m.s^{-1}$]	*67; 220*	**weight of blasting filler [*kg*]**	*0.615*	**weight propellant of basic charge [*g*]**		*8*
		type of fuze	*M-5, mz 36*	**partial charges "rolls" - "PC"**		*6 pcs*
maximum range (of fire) [*m*]	*3560*					
				propellant partial charge		*Ng dp 0.15/1-12.0*
				total weight propellant charges No. Z, 2, 4, 6 [*g*]	*Z*	*BC = 8*
					2	*BC+2PC = 24*
					4	*BC+4PC = 40*
					6	*BC+6PC = 56*

PACKING

Number of cartridges in the crate	*3*	**Weight of full crate [*kg*]**	*13*

DESCRIPTION

82-EO-M 52 is used to engage personnel, destroying gun positions and destroying trenches and shelters. This projectile consists of a body (2), fuze (1), stabilizer (5), fins (7), bursting charge (3) and basic charge (6).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Red*

FUZE

Type	Characteristic
M-5, mz 36	*Fuze is nose mounted, superquick and instantaneous.*

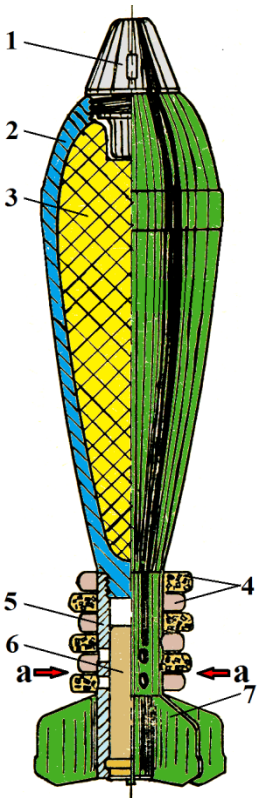
SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

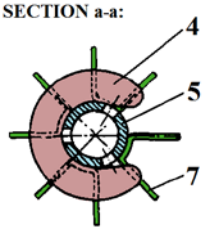
NOTICE

Index method of production of the body(33) „A" means that the body has been made casting. Projectile has 8 stabilizing fins (7).

DRAWINGS/CUTAWAY/MARKING/STENCILING

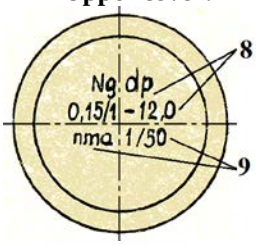


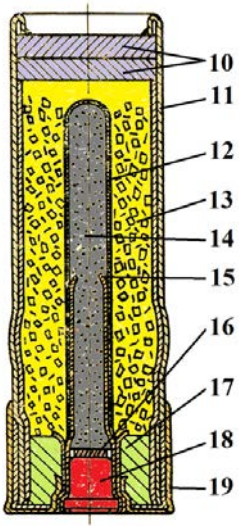
SECTION a-a:



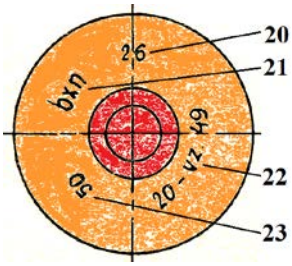
BASIC CHARGE

Upper cover:

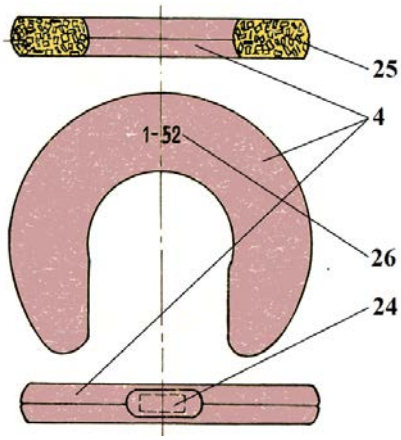


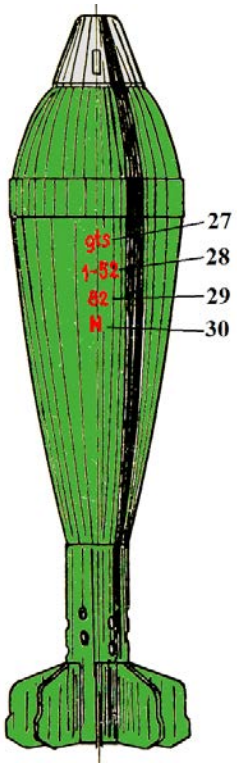


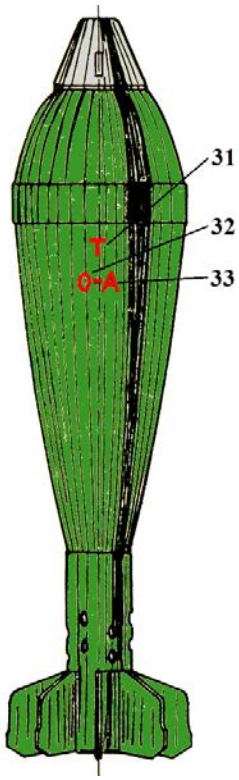
Bottom of the cartridge case:



PARTIAL CHARGE







LEGEND

1 - Fuze;
2 - Body;
3 - Bursting charge;
4 - Partial charges;
5 - Stabilizer;
6 - Basic charge;
7 - Fins;
8 - Marking of powder (type, shape, dimension)
9 - Index of manufacturer and series/year of propellant production;
10 - Covers;
11 - Cartridge paper case;
12 - Paper tube;
13 - Propellant;
14 - Black powder;
15 - Initial tube;
16 - Valve;
17 - Paper stopper;
18 - Primer;
19 - Cartridge iron case;
20 - Series of basic charge and also series mechanical production;
21 - Index of filling factory;
22 - Type of basic charge;
23 - Year of basic charge production;

<u>Partial charge</u>:
24 - Closing seam;
25 - Propellant;
26 - Series-year of propellant production;

<u>Projectile</u>:
27 - Symbol of filling factory;
28 - Series and year of projectile production;
29 - Calibre;
30 - Weight sign;
31 - Type of explosive;
32 - Type of projectile;
33 - Index method of production of the body.

	FWP Ammunition	**ANNEX C-76**

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm High Explosive Fragmentation - Mortar Bomb*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*O-832*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *82 mm Mortar M37, M41, M52* *(82-M-37, 82-M-41, 82-M-52)*

CARTRIDGE	
abbreviation	*O-832*
average weight with fuze M-5 [*kg*]	*3.15*
length [*mm*]	*325 - 331*
initial velocity of projectile (charge No. Z; 6) [$m.s^{-1}$]	*70; 211*
maximum range (of fire) [*m*]	*3040*

PROJECTILE	
abbreviation	*O-832*
weight [*kg*]	*3.10*
length [*mm*]	*325 - 331*
type of explosives	*as marked*
weight of bursting charge [kg]	*0.40*
type of fuze	*M-5*

CHARGE		
abbreviation basic charges		*BM*
		НБСп
propellant basic charge		*НБПЛ 14-10*
		НБСп 13-47
weight propellant of basic charge "BC" [*g*]		*8*
partial charges „boat" - „PC"		*6 pcs*
propellant partial charge		*BM*
		П-45
total weight propellant charges No. 0, 2, 4, 6 [*g*]	*0*	*BC = 8*
	2	*BC+2PC = 22*
	4	*BC+4PC = 36*
	6	*BC+6PC = 50*

PACKING			
Number of cartridges in the crate	*3*	**Weight of full crate *kg*]**	*13*

DESCRIPTION

O-832 is used to engage personnel, destroying gun positions and destroying trenches and shelters. This projectile consists of a body (5), fuze (1), stabilizer (6), fins (7), bursting charge (3) and booster charge (2).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

FUZE	
Type	**Characteristic**
M-5	*Fuze is nose mounted, superquick and instantaneous.*

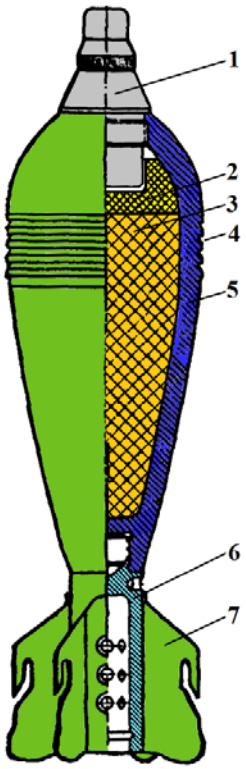
SAFETY CONSIDERATION THREAT

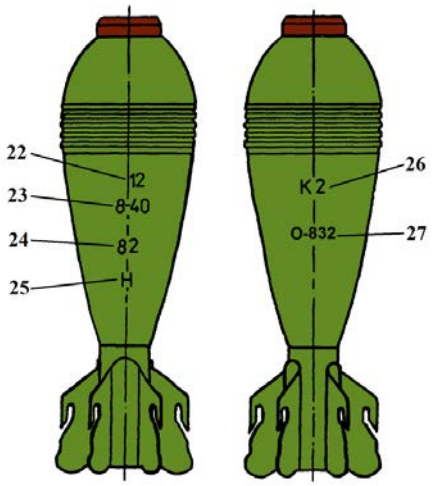
Do not touch and do not move unexploded projectile.

NOTICE

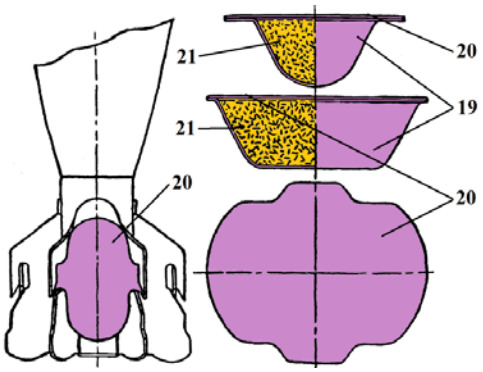
Type of explosive: K2; Ш; Шт; A-40; A-80; AT-40. Projectile has 6 stabilizing fins (7).

DRAWINGS/CUTAWAY/MARKING/STENCILING

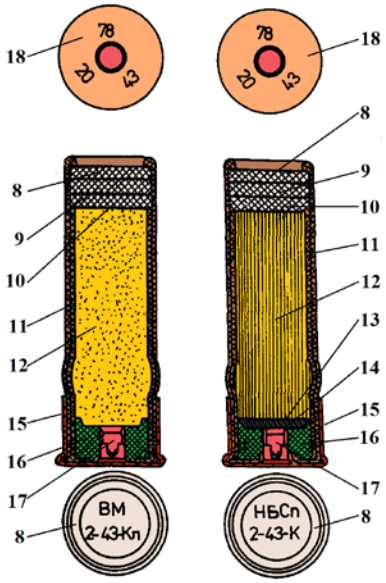




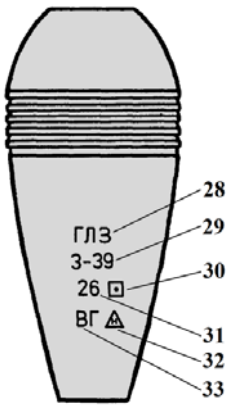
PARTIAL CHARGE



BASIC CHARGE



HAMMERED MARKING OF PROJECTILE



LEGEND

1 - Fuze;
2 - Booster charge;
3 - Bursting charge;
4 - centring ring - Labyrinth seal;
5 - Body;
6 - Stabilizer;
7 - Fins;
8 - Upper cover;
9, 10 - Covers;
11 - Double cardboard tube;
12 - Propellant;
13 - Bottom cover;
14 - Igniter;
15 - Cartridge iron case;
16 - Paper stopper;
17 - Primer;
18 - Bottom of cartridge iron case;
19 - Body of partial charge;
20 - Cover;
21 - Propellant; 22 - Symbol of filling factory;
23 - Series and year of projectile production;
24 - Calibre;
25 - Weight sign;
26 - Type of explosive;
27 - Type of projectile;
28 - Symbol of manufacturer of projectile body;
29 - Series and year of body production;
30 - Impression of hardness tests;
31 - Number of melt;
32 - Symbol of control;
33 - Symbol of inspection.

	FWP Ammunition	**ANNEX C-77**

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm High Explosive - Fragmentation - Mortar Bomb*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*О-832Д*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *82 mm Mortar M37, M41, M52* *(82-M-37, 82-M-41, 82-M-52)*

CARTRIDGE	
abbreviation	*О-832Д*
average weight with fuze M-5; mz 36 [*kg*]	*3.15; 3.36*
average weight with fuze mz36 [*kg*]	*3.31*
length [*mm*]	*325 - 331*
initial velocity of projectile (charge No. Z; 6) [$m.s^{-1}$]	*70; 211*
maximum range (of fire) [*m*]	*3040*

PROJECTILE	
abbreviation	*О-832Д*
weight [*kg*]	*3.10; 3.31*
length [*mm*]	*325 - 331*
type of explosives	*as marked*
weight of bursting charge [kg]	*0.40*
type of fuze	*M-5, mz 36*

CHARGE		
abbreviation basic charges		*ВМ*
		НБСп
type of propellant basic charge "BC"		*НБПЛ 14-10А*
		НБСп 13-47
weight propellant of basic charge [*g*]		*8*
partial charges „ring" - „PC"		*3 pcs*
type of propellant partial charge		*НВК 32/65-14*
		НБК 32/65-14
total weight propellant charges No. 0, 1, 2, 3 [*g*]	*0*	*BC = 8*
	1	*BC+1PC = 21*
	2	*BC+2PC = 34.5*
	3	*BC+3PC = 48*

PACKING

Number of cartridges in the crate	*3*	**Weight of full crate *kg*]**	*13*

DESCRIPTION

О-832Д is used to engage personnel, destroying gun positions and destroying trenches and shelters. This projectile consists of a body (5), fuze (1), stabilizer (6), fins (7), bursting charge (3) and booster charge (2).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

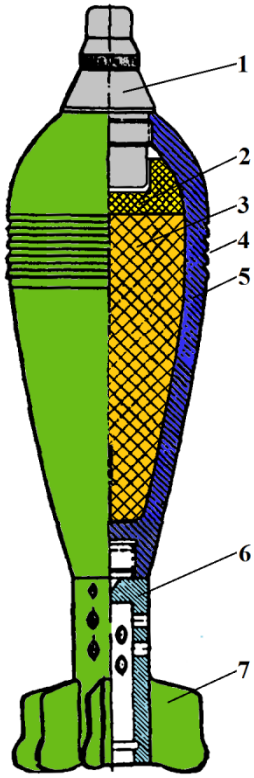
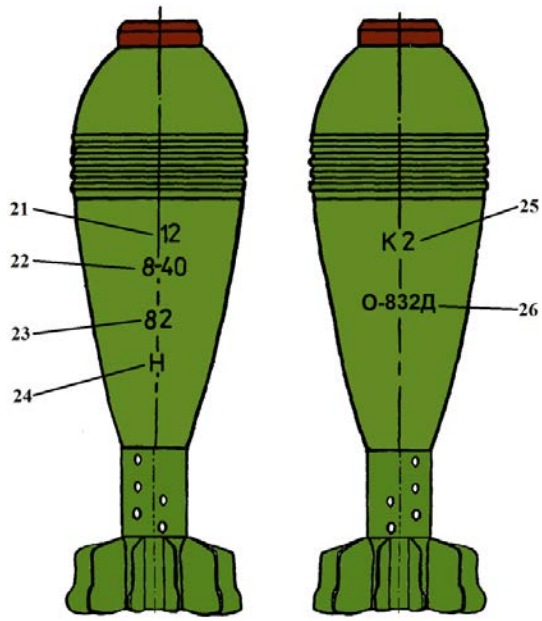
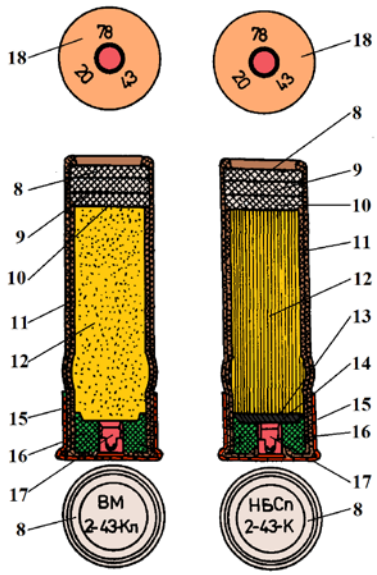
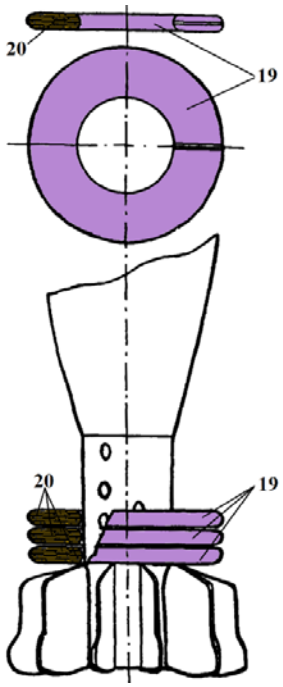
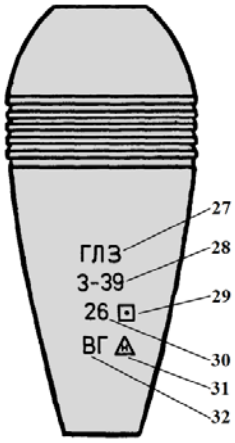
Type	Characteristic
M-5, mz 36	*Fuzes is nose mounted, superquick and instantaneous.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Type of explosive: К2; Ш; Шт; А-40; А-80; АТ-40. Projectile has 10 stabilizing fins (7).

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
			*1 - Fuze;* *2 - Booster charges;* *3 - Bursting charge;* *4 - Centring ring - Labyrinth seal;* *5 - Body;* *6 - Stabilizer;* *7 - Fins;* *8 - Upper cover;* *9, 10 - Covers;* *11 - Double cardboard tube;* *12 - Propellant;* *13 - Bottom cover;* *14 - Igniter;* *15 - Cartridge iron case;* *16 - Paper stopper;* *17 - Primer;* *18 - Bottom of cartridge iron case;* *19 - Cloth pouch;* *20 - Propellant;* *21 - Symbol of filling factory;* *22 - Series and year of projectile production;* *23 - Calibre;* *24 - Weight sign;* *25 - Type of explosive;* *26 - Type of projectile;* *27 - Symbol of manufacturer of projectile body;* *28 - Series and year of body production;* *29 - Impression of hardness tests;* *30 - Number of melt;* *31 - Symbol of control;* *32 - Symbol of inspection.*
BASIC CHARGE	**PARTIAL CHARGE**	**HAMMERED MARKING OF PROJECTILE**	
			

FWP Ammunition

ANNEX C-78

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm Smoke Projectile - Mortar Bomb*
TYPE	*SP*
NAME/ASSIGNED MARK (original)	*82-ED-M 52*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by* *82 mm Mortar M37, M41, M52* *(82-M-37, 82-M-41, 82-M-52)*

CARTRIDGE	
abbreviation	*82-ED-M 52*
average weight [*kg*]	*3.436*
length [*mm*]	*344*
initial velocity of projectile (charge No. Z; 6) [$m.s^{-1}$]	*67; 220*
maximum range (of fire) [*m*]	*3560*

PROJECTILE	
abbreviation	*82-D-M*
weight [*kg*]	*3.380*
length [*mm*]	*344*
type of explosives	*TNT*
weight of blasting filler [*kg*]	*0.047*
type of smoke screening agent	*Chlor-sulphonic acid*
weight of smoke screening agent	*0.650*
type of fuze	*mz 50*

CHARGE		
abbreviation basic charge "BC"		*20 - vz. 49*
propellant basic charge		*Ng dp 0.15/1-12.0*
weight propellant of basic charge [*g*]		*8*
partial charges "crescent" - "PC"		*6 pcs*
propellant partial charge		*Ng dp 0.15/1-12.0*
total weight propellant charges No. Z, 2, 4, 6 [*g*]	*Z*	*BC = 8*
	2	*BC+2PC = 24*
	4	*BC+4PC = 40*
	6	*BC+6PC = 56*

PACKING

Number of cartridges in the crate	*3*	**Weight of full crate *kg*]**	*13*

DESCRIPTION

82-ED-M 52 is used to make a white smoke screen. It used to mask movement, position or the origin of fire from the enemy or marking the battlefield. This projectile consists of a body (4), fuze (1), bursting charges (3), smoke screening agent (5), filling hole screw (6), stabilizer (7), and fins (9).

COLOR and MARKING

Body colour:	*Black*
Text colour:	*White*

FUZE

Type	Characteristic
mz 50	*Fuze is nose mounted, superquick and instantaneous.*

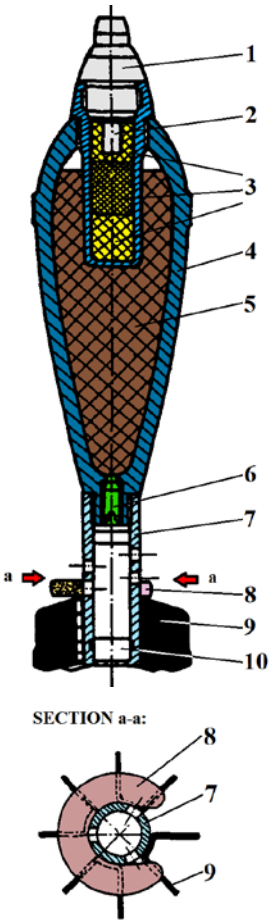
SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

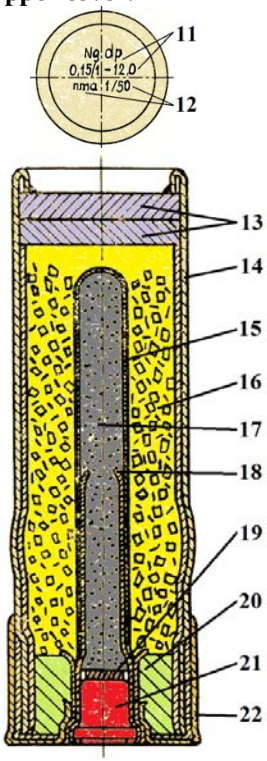
Chlor-sulphonic acid filler is loaded before shooting. Projectile has 8 stabilizing fins (9).

DRAWINGS/CUTAWAY/MARKING/STENCILING

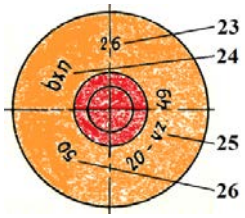


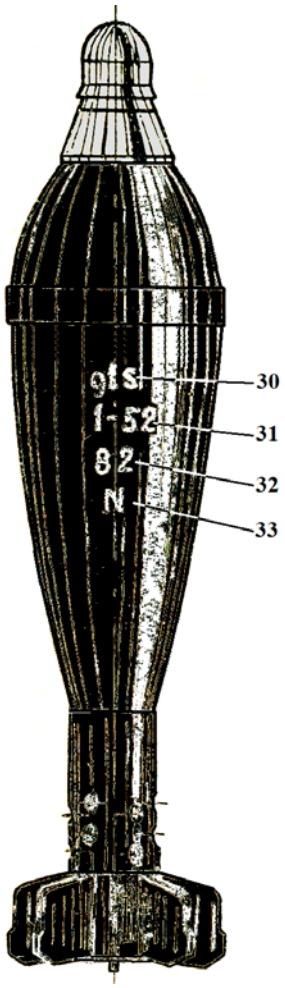
BASIC CHARGE

Upper cover:

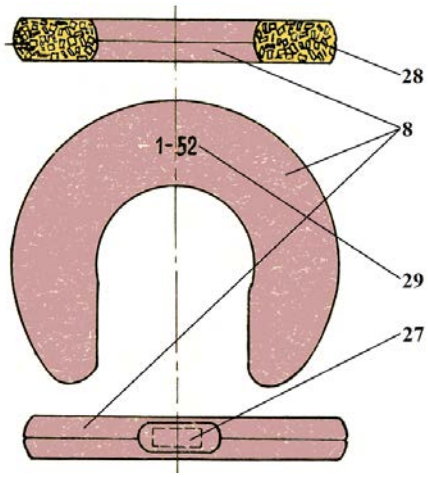


Bottom of the cartridge case:





PARTIAL CHARGE



LEGEND

1 - Fuze;
2 - Detonator of fuze;
3 - Bursting charges;
4 - Body;
5 - Smoke screening agent;
6 - Screw of filling hole;
7 - Stabilizer;
8 - Partial charge;
9 - Fins;
10 - Place of basic charge;
11 - Marking of powder (type, shape, dimension)
12 - Index of manufacturer and series/year of propellant production;
13 - Covers;
14 - Cartridge paper case;
15 - Paper tube;
16 - Propellant;
17 - Black powder;
18 - Initial tube;
19 - Valve;
20 - Paper stopper;
21 - Primer;
22 - Cartridge iron case;
23 - Series of basic charge and also series mechanical production;
24 - Index of filling factory;
25 - Type of basic charge;
26 - Year of basic charge production;

<u>Partial charge</u>:
27 - Seam;
28 - Propellant;
29 - Series-year of propellant production;

<u>Projectile</u>:
30 - Symbol of filling factory;
31 - Series and year of projectile production;
32 - Calibre;
33 - Weight sign.

FWP Ammunition

ANNEX C-79

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm Smoke Projectile - Mortar Bomb*
TYPE	*SP*
NAME/ASSIGNED MARK (original)	*Д-832*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *82 mm Mortar M37, M41, M52* *(82-M-37, 82-M-41, 82-M-52)*

CARTRIDGE		PROJECTILE		CHARGE		
abbreviation	*Д-832*	**abbreviation**	*Д-832*	**abbreviation basic charges**		*ВМ*
average weight with fuze M-5 [*kg*]	*3.46*	**weight [*kg*]**	*3.41*			*НБСп*
		length [*mm*]	*325 - 331*	**propellant basic charge**		*НБПЛ 14-10*
length [*mm*]	*325 - 331*	**type of explosive**	*TNT*			*НБСп 13-47*
initial velocity of projectile (charge No. Z; 6) [$m.s^{-1}$]	*70; 211*	**weight of bursting charge [kg]**	*0.066*	**weight propellant of basic charge "BC" [*g*]**		*8*
		type of smoke chemical agent	*P-4*	**partial charges „boat" - „PC"**		*6 pcs*
maximum range (of fire) [*m*]	*3040*	**weight of smoke chemical agent [kg]**	*0.338*	**propellant partial charge**		*ВМ*
						П-45
		type of fuze	*M-5*	**total weight propellant charges No. 0, 2, 4, 6 [*g*]**	*0*	*BC = 8*
					2	*BC+2PC = 22*
					4	*BC+4PC = 36*
					6	*BC+6PC = 50*

PACKING

Number of cartridges in the crate	*3*	**Weight of full crate *kg*]**	*13*

DESCRIPTION

Д-832 is used to make a white smoke screen. It used to mask movement, position or the origin of fire from the enemy or marking battlefield. This projectile consists of a body (3), fuze (1), stabilizer (6), fins (7), booster charge (2) and chemical smoke agent (5).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
M-5	*Fuze is nose mounted, superquick and instantaneous.*

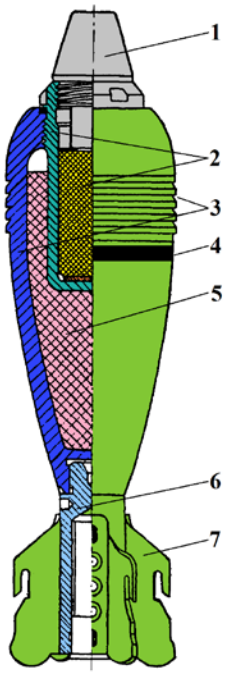
SAFETY CONSIDERATION THREAT

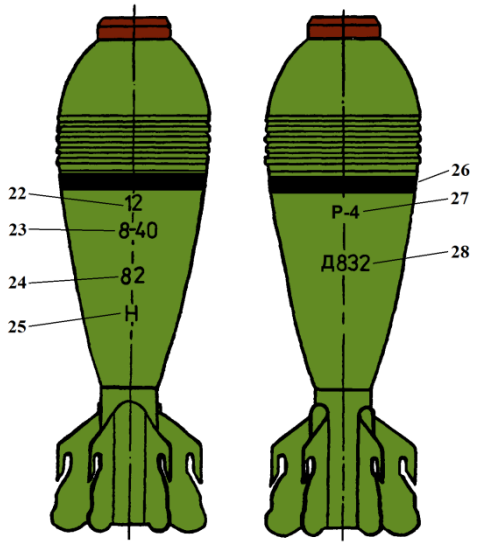
Fired projectile may be touched and moved.

NOTICE

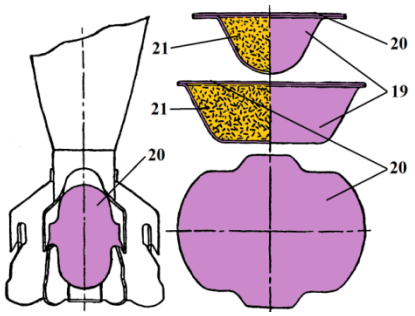
*Identification of **P-4** indicates a chemical agent - yellow phosphorus. Projectile has 6 stabilizing fins (7).*

DRAWINGS/CUTAWAY/MARKING/STENCILING

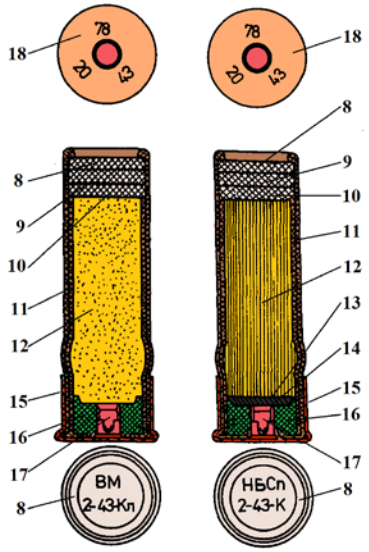




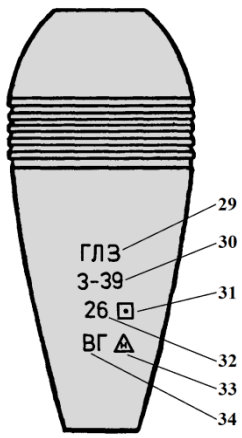
PARTIAL CHARGE



BASIC CHARGE



HAMMERED MARKING OF PROJECTILE



LEGEND

1 - Fuze;
2 - Case with booster charge;
3 - Body with centering ring - Labyrinth seal;
4 - Black stripe - graphic marking of smoke projectile;
5 - Chemical smoke agent;
6 - Stabilizer;
7 - Fins;
8 - Upper cover;
9, 10 - Covers;
11 - Double cardboard tube;
12 - Propellant;
13 - Bottom cover;
14 - Igniter;
15 - Cartridge iron case;
16 - Paper stopper;
17 - Primer;
18 - Bottom of cartridge iron case;
19 - Body of partial charge;
20 - Cover;
21 - Propellant;
22 - Symbol of filling factory;
23 - Series and year of projectile production;
24 - Calibre;
25 - Weight sign;
26 - Black stripe - graphic marking of smoke projectile;
27 - Type of chemical smoke agent;
28 - Type of projectile;
29 - Symbol of manufacturer of projectile body;
30 - Series and year of body production;
31 - Impression of hardness tests;
32 - Number of melt;
33 - Symbol of control;
34 - Symbol of inspection.

	FWP Ammunition	**ANNEX C-80**

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm Smoke Projectile - Mortar Bomb*
TYPE	*SP*
NAME/ASSIGNED MARK (original)	*Д-832Д*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *82 mm Mortar M37, M41, M52* *(82-M-37, 82-M-41, 82-M-52)*

CARTRIDGE		PROJECTILE		CHARGE		
abbreviation	*Д-832Д*	**abbreviation**	*Д-832Д*	**abbreviation basic charges**		*BM*
average weight with fuze M5; mz36 [*kg*]	*3.46; 3.72*	**weight [*kg*]**	*3.41; 3.67*			*НБСп*
		length [*mm*]	*325 - 331*	**type of propellant basic charge**		*НБПЛ 14-10А*
length [*mm*]	*325 - 331*	**type of explosive**	*TNT*			*НБСп 13-47*
initial velocity of projectile (charge No. Z; 6) [$m.s^{-1}$]	*70; 211*	**weight of bursting charge [kg]**	*0.066*	**weight propellant of basic charge "BC" [*g*]**		*8*
		type of ccrimpical agent	*P-4*	**partial charges „ring" - „PC"**		*3 pcs*
maximum range (of fire) [*m*]	*3040*	**weight of ccrimpical agent [kg]**	*0.338*	**type of propellant partial charge**		*НВК 32/65-14*
						НБК 32/65-14
		type of fuze	*M-5, mz 36*	**total weight propellant charges No. 0, 1, 2, 3 [*g*]**	*0*	*BC = 8*
					1	*BC+1PC = 21*
					2	*BC+2PC = 34.5*
					3	*BC+3PC = 48*

PACKING			
Number of cartridges in the crate	*3*	**Weight of full crate *kg*]**	*13*

DESCRIPTION

Д-832Д is used to make a white smoke screen. It used to mask movement, position or the origin of fire from the enemy or marking battlefield. This projectile consists of a body (3), fuze (1), stabilizer (6), fins (7), booster charge (2) and chemical smoke agent (5).

COLOR and MARKING

Body colour:	*Olive with black band below the centring ring*
Text colour:	*Black*

FUZE

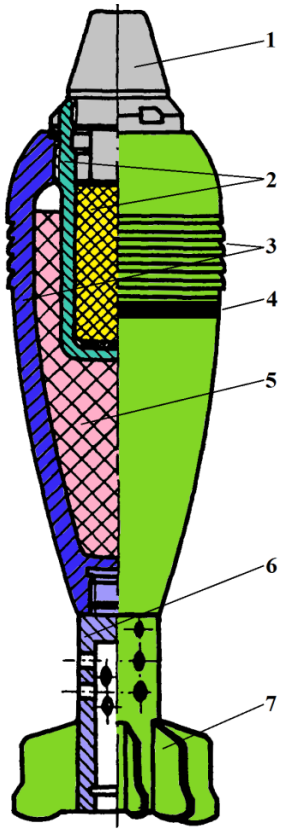
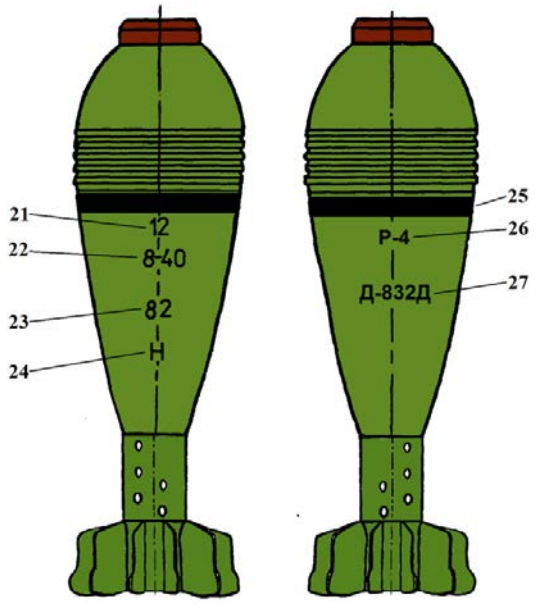
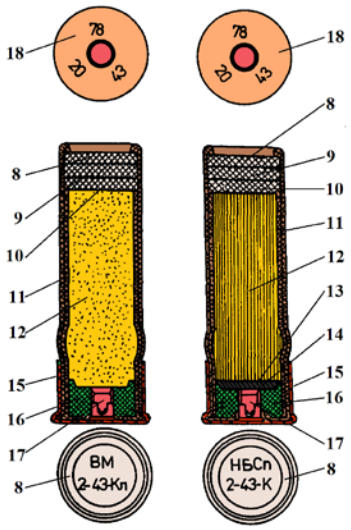
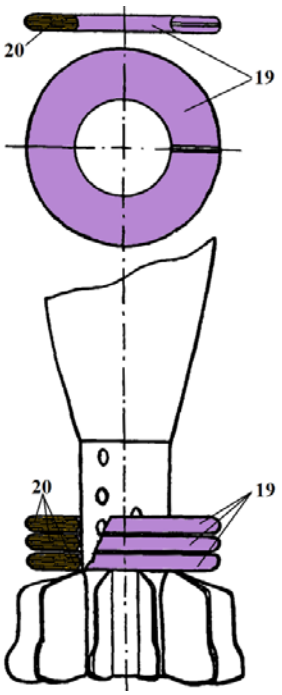
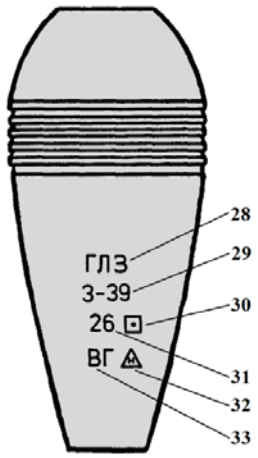
Type	Characteristic
M-5, mz 36	*Fuzes is nose mounted, superquick and instantaneous.*

SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

Identification of P-4 indicates a chemical smoke agent - yellow phosphorus. Projectile has 10 stabilizing fins (7).

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
			*1 - Fuze;* *2 - Case with booster charge;* *3 - Body with centring ring - labyrinth seal;* *4 - Black stripe - graphic marking of smoke projectile;* *5 - Chemical smoke agent;* *6 - Stabilizer;* *7 - Fins;* *8 - Upper cover;* *9, 10 - Covers;* *11 - Double cardboard tube;* *12 - Propellant;* *13 - Bottom cover;* *14 - Igniter;* *15 - Cartridge iron case;* *16 - Paper stopper;* *17 - Primer;* *18 - Bottom of cartridge iron case;* *19 - Cloth pouch;* *20 - Propellant;* *21 - Symbol of filling factory;* *22 - Series and year of projectile production;* *23 - Calibre;* *24 - Weight sign;* *25 - Black stripe - graphic marking of smoke projectile;* *26 - Type of chemical smoke agent;* *27 - Type of projectile;* *28 - Symbol of manufacturer of projectile body;* *29 - Series and year of body production;* *30 - Impression of hardness tests;* *31 - Number of melt;* *32 - Symbol of control;* *33 - Symbol of inspection.*
BASIC CHARGE	**PARTIAL CHARGE**	**HAMMERED MARKING OF PROJECTILE**	
			

FWP Ammunition

ANNEX C-81

FIELD of AMMUNITION	*artillery*
CALIBER	*82 mm*
NAME	*82 mm High Explosive - Fragmentation - Mortar Bomb – Practice*
TYPE	*HE-FRAG - Practice*
NAME/ASSIGNED MARK (original)	*82-EONh-M 52*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD	*Fired by 82 mm Mortar M37, M41, M52 (82-M-37, 82-M-41, 82-M-52)*

CARTRIDGE		PROJECTILE		CHARGE		
abbreviation	*82-EONh-M 52*	**abbreviation**	*82-ONh-M*	**abbreviation basic charge "BC"**		*20 - vz. 49*
average weight [*kg*]	*3.350*	**weight [*kg*]**	*3.300*			
		length [*mm*]	*325 - 331*	**propellant basic charge**		*Ng dp 0.15/1-12.0*
length [*mm*]	*325 - 331*	**type of explosives**	---			
initial velocity of projectile (charge No. Z; 6) [$m.s^{-1}$]	*67; 220*	**weight of blasting filler [*kg*]**	---	**weight propellant of basic charge [*g*]**		*8*
		type of fuze	*M-5 dummy*	**partial charges "crescent" - "PC"**		*6 pcs*
maximum range (of fire) [*m*]	*3560*			**propellant partial charge**		*Ng dp 0.15/1-12.0*
				total weight propellant charges No. Z, 2, 4, 6 [*g*]	*Z*	*BC = 8*
					2	*BC+2PC = 24*
					4	*BC+4PC = 40*
					6	*BC+6PC = 56*

PACKING

Number of cartridges in the crate	*3*	**Weight of full crate *kg*]**	*13*

DESCRIPTION

82-EONh-M 52 is used for training and testing the engagement of personnel, destroying gun positions and destroying trenches and shelters. This projectile consists of a body (2), fuze - dummy (1), stabilizer (6), fins (8), inert material (3) and basic charge (7).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	Characteristic
M-5 dummy	*Fuze without explosive.*

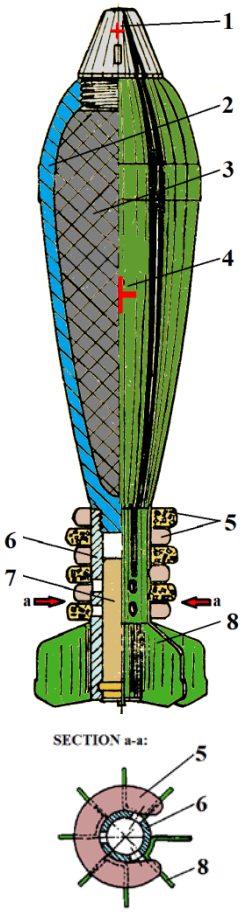
SAFETY CONSIDERATION THREAT

Fired projectile may be touched and moved.

NOTICE

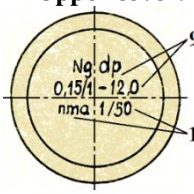
Projectile has 8 stabilizing fins (8).

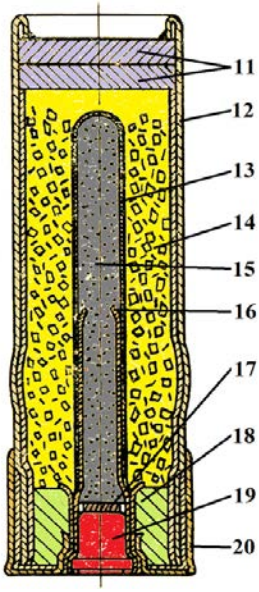
DRAWINGS/CUTAWAY/MARKING/STENCILING



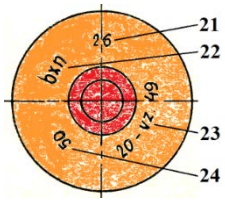
BASIC CHARGE

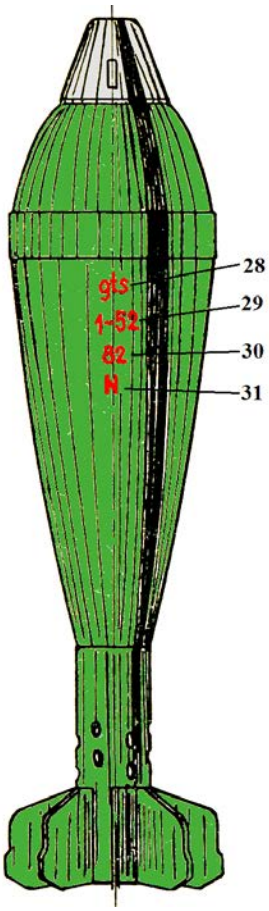
Upper cover:



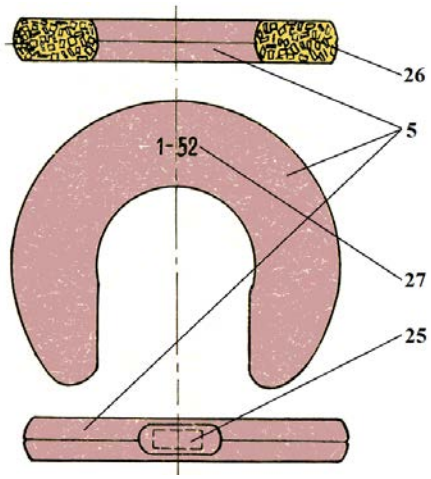


Bottom of the cartridge case:





PARTIAL CHARGE



LEGEND

1 - Fuze - dummy with red cross - marking of type fuze - dummy;
2 - Body;
3 - Inert material;
4 - Red cross - marking of type projectile - Practice ;
5 - Partial charges;
6 - Stabilizer;
7 - Basic charge;
8 - Fins;
9 - Marking of powder (type, shape, dimension)
10 - Index of manufacturer and series/year of propellant production;
11 - Covers;
12 - Cartridge paper case;
13 - Paper tube;
14 - Propellant;
15 - Black powder;
16 - Initial tube;
17 - Valve;
18 - Paper stopper;
19 - Primer;
20 - Cartridge iron case;
21 - Series of basic charge and also series mechanical production;
22 - Index of filling factory;
23 - Type of basic charge;
24 - Year of basic charge production;

<u>Partial charge</u>:
25 - Seam;
26 - Propellant;
27 - Series-year of propellant production;

<u>Projectile</u>:
28 - Symbol of filling factory;
29 - Series and year of projectile production;
30 - Calibre;
31 - Weight sign.

FWP Ammunition

ANNEX C-82

FIELD of AMMUNITION	*artillery*
CALIBER	*120 mm*
NAME	*120 mm High Explosive - Fragmentation - Mortar Bomb*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*120-EOF-M*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD;	*Fired by* *120 mm mortar PRAM-L (M1982),* *120 mm self-propelled mortar PRAM-S,* *120 mm mortar M38, M43* *and all 120 mm smoothbore mortars*

CARTRIDGE	
abbreviation	*120-EOF-M*
average weight [*kg*]	*~16.50*
length [*mm*]	*720*
initial velocity of projectile (charge No. 1; 6) [$m.s^{-1}$]	*124; 280*
maximum range (of fire) [*m*]	*~6000*

PROJECTILE	
abbreviation	*120-OF*
weight [*kg*]	*16.00*
length [*mm*]	*720*
type of explosives	*TNT/H/E*
weight of blasting filler [*kg*]	*2.66*
type of fuze	*MZ-81*

CHARGE		
abbreviation basic charge - OCHOB. "BC"		*NBL - 35*
propellant basic charge		*Ng pp-NBL 35*
weight propellant of basic charge [*g*]		*32*
partial charges - ДОПОЛ. "PC"		*6 pcs*
length of "PC"[*mm*]		*~270*
propellant partial charge		*Nc tp-VTM*
weight propellant of 1 pc partial charge [*g*]		*77*
total weight propellant charges No. 1, 2, 3, 4, 5 a 6 [*g*]	*1*	*BC+1PC = 109*
	2	*BC+2PC = 186*
	3	*BC+2PC = 263*
	4	*BC+2PC = 340*
	5	*BC+4PC = 417*
	6	*BC+6PC = 494*

PACKING

Number of cartridges in the crate	*2*	**Weight of full crate [*kg*]**	*48.5*
Number of cartridges in the paper tube container	*1*	**Weight of full paper tube container [*kg*]**	*21.3*

DESCRIPTION

120-EOF is used to engage personnel, destroying gun positions, trenches and shelters. This projectile consists of a body (2), fuze (1), stabilizer (5), fins (6), and bursting charge (4).

COLOR and MARKING

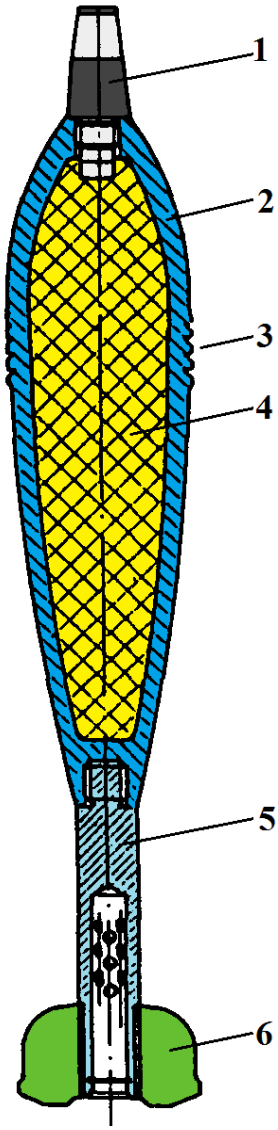
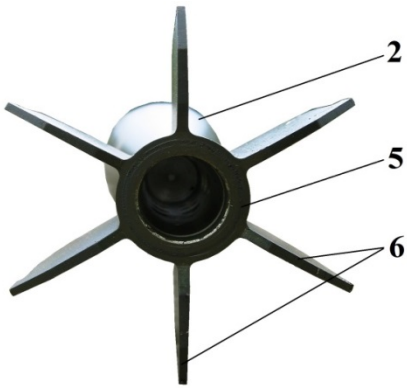
Body colour:	*Olive*
Text colour:	*Black*

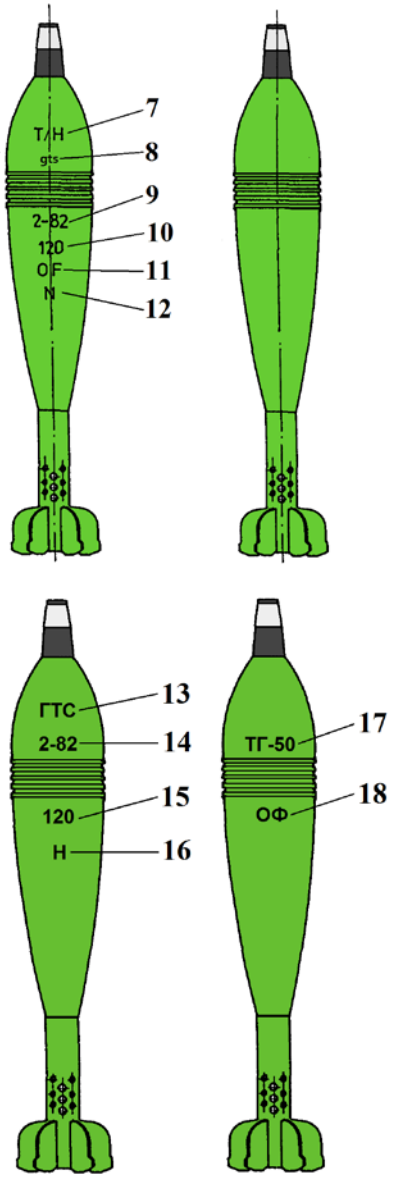
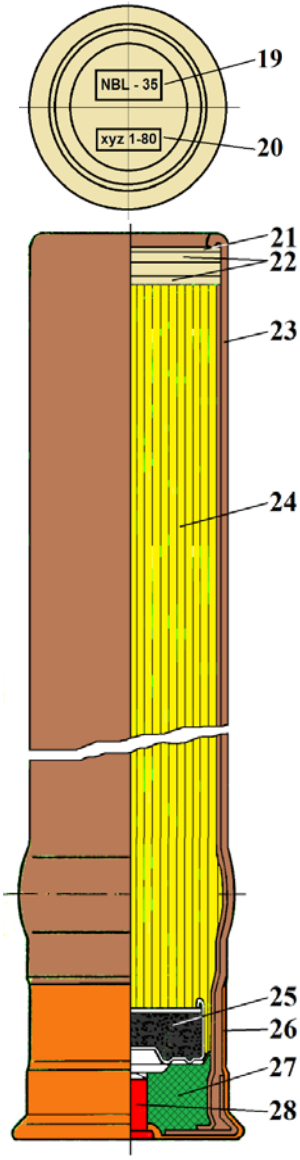
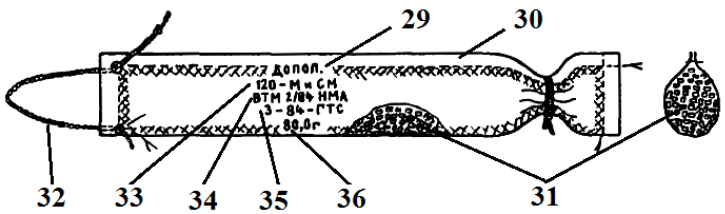
FUZE

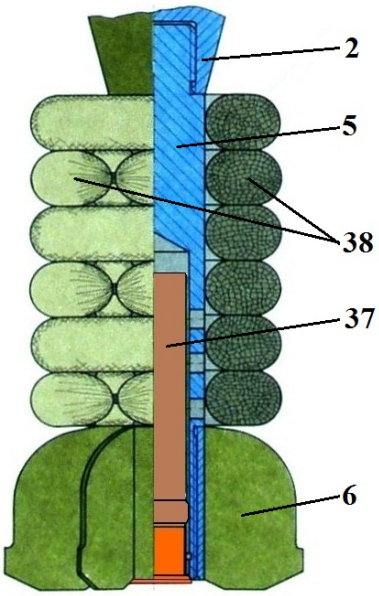
Type	Characteristic
MZ-81	*Fuze is nose, impact, with instantaneous and delay settings, safety provided by masking.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
 	*1 - Fuze;* *2 - Body;* *3 - Centring sealing collar (gas check)* *4 - Bursting charge;* *5 - Stabilizer;* *6 - Fins.*

PROJECTILE	BASIC CHARGE	LEGEND
	**Upper cover** 	*<u>Projectile</u>:* *7 - Type of explosive;* *8 - Index of manufacturer;* *9 - Series-year production of projectile;* *10 - Calibre;* *11 - Type of projectile;* *12 - Weight sign;* *13 - Index of manufacturer;* *14 - Series-year production of projectile;* *15 - Calibre;* *16 - Weight sign;* *17 - Type of explosive;* *18 - Type of projectile;* *<u>Basic charge</u>:* *19 - Marking of powder;* *20 - Index of manufacturer and series-year of propellant production;* *21 - Upper cover;* *22 - Covers;* *23 - Cartridge paper case;* *24 - Propellant;* *25 - Igniter;* *26 - Cartridge brass case;* *27 - Stopper;* *28 - Primer;* *<u>Partial charge</u>:* *29 - Marking of „PC“;* *30 - Textile sack;* *31 - Propellant (partial cut);* *32 - Fixing rope;* *33 - Calibre and type of weapon;* *34 - Propellant type and series/year of propellant production and marking of manufacturer;* *35 - Series-year of „PC“ production and marking of manufacturer;* *36 - Weight of propellant in partial charge.*
PARTIAL CHARGE “ДОПОЛ.”		
		

LOCATION BASIC AND PARTIAL CHARGE	LEGEND
	*2 - Body;* *5 - Stabilizer;* *6 - Fins;* *37 - Basic charge;* *38 - Partial charge.*

NOTICE
Stabilizer and fins are made from dural. Projectile has 6 stabilizing fins (6).

FWP Ammunition

ANNEX C-83

FIELD of AMMUNITION	*artillery*
CALIBER	*120 mm*
NAME	*120 mm High Explosive - Fragmentation - Mortar Bomb*
TYPE	*HE-FRAG*
NAME/ASSIGNED MARK (original)	*ОФ-843Б*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD;	*Fired by* *120 mm mortar PRAM-L (M1982),* *120 mm self-propelled mortar PRAM-S,* *120 mm mortar M38, M43* *and all 120 mm smoothbore mortars*

CARTRIDGE	
abbreviation	*53-ОФ-843Б*
average weight [*kg*]	*~16.50*
length [*mm*]	*667*
initial velocity of projectile (charge No. 1; 6) [$m.s^{-1}$]	*126; 284*
maximum range (of fire) [*m*]	*~6000*

PROJECTILE	
abbreviation	*ОФ-843Б*
weight [*kg*]	*16.00*
length [*mm*]	*667*
type of explosives	*ТД-50*
weight of blasting filler [*kg*]	*1.4*
type of fuze	*M-12*

CHARGE		
abbreviation basic charge - ОСНОВ. "ВС"		*NBL - 35*
propellant basic charge		*Ng pp-NBL 35*
weight propellant of basic charge [*g*]		*32*
partial charges - ДОПОЛ. "РС"		*6 pcs*
length of "PC"[*mm*]		*~270*
propellant partial charge		*Nc tp-VTM*
weight propellant of 1 pc partial charge [*g*]		*77*
total weight propellant charges No. 1, 2, 3, 4, 5 a 6 [*g*]	*1*	*BC+1PC = 109*
	2	*BC+2PC = 186*
	3	*BC+2PC = 263*
	4	*BC+2PC = 340*
	5	*BC+4PC = 417*
	6	*BC+6PC = 494*

PACKING

Number of cartridges in the crate	*2*	**Weight of full crate [*kg*]**	*48.5*
Number of cartridges in the paper tube container	*1*	**Weight of full paper tube container [*kg*]**	*21.3*

DESCRIPTION

120-EOF is used to engage personnel, destroying gun positions, trenches and shelters. This projectile consists of a body (2), fuze (1), stabilizer (5), fins (6), and bursting charge (4).

COLOR and MARKING

Body colour:	*Grey*
Text colour:	*Black*

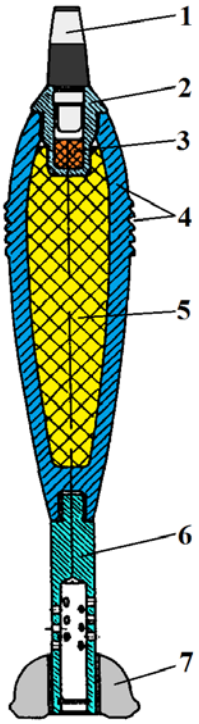
FUZE

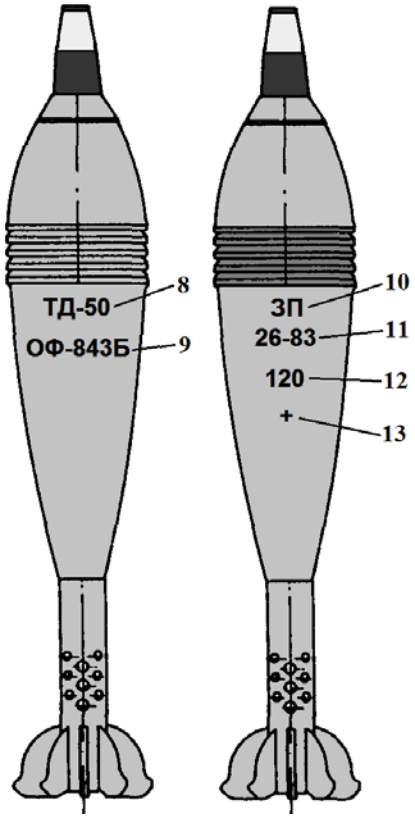
Type	Characteristic
M-12	*Fuze is nose, impact, with instantaneous and delay settings, safety provided by masking.*

SAFETY CONSIDERATION THREAT

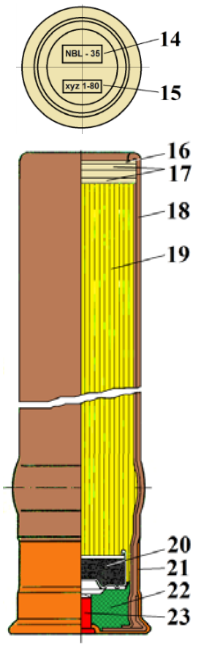
Do not touch and do not move unexploded projectile.

DRAWINGS/CUTAWAY/MARKING/STENCILING

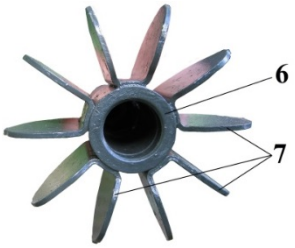




BASIC CHARGE



FINS STABILIZER



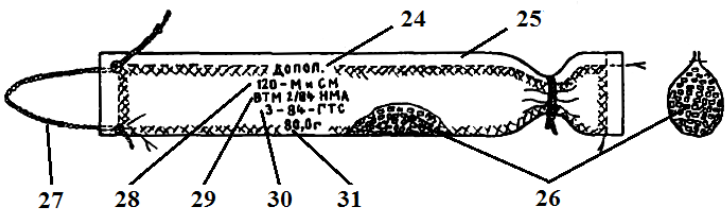
LEGEND

1 - Fuze; 2 - Fuze adapter;
3 - Booster charge;
4 - Body with centring sealing collar (gas check);
5 - Bursting charge;
6 - Stabilizer;
7 - Fins;
8 - Type of explosive;
9 - Type of projectile;
10 - Index of manufacturer;
11 - Series-year production of projectile;
12 - Calibre; 13 - Weight sign;

Basic charge:
14 - Marking of powder;
15 - Index of manufacturer and series-year of propellant production;
16 - Upper cover;
17 - Covers;
18 - Cartridge paper case;
19 - Propellant;
20 - Igniter;
21 - Cartridge brass case;
22 - Stopper; 23 - Primer;

Partial charge:
24 - Marking of „PC“;
25 - Textile sack;
26 - Propellant (partial cut);
27 - Fixing rope;
28 - Calibre and type of weapon;
29 - Propellant type and series/year of propellant production and marking of manufacturer;
30 - Series-year of „PC“ production and marking of manufacturer;
31 - Weight of propellant in partial charge.

PARTIAL CHARGE “ДОПОЛ.”



NOTICE

Charges are made in Slovakia (Czechoslovakia). Stabilizer and fins are made from iron. Projectile has 10 stabilizing fins (6).

	FWP Ammunition	**ANNEX C-84**

FIELD of AMMUNITION	*artillery*
CALIBER	*120 mm*
NAME	*120 mm High Explosive - Fragmentation - Mortar Bomb - Long-range*
TYPE	*HE-FRAG-LR*
NAME/ASSIGNED MARK (original)	*120-EOFd-M*
COUNTRY of ORIGIN	*Czechoslovakia*
DEPLOYMENT METHOD;	*Fired by* *120 mm mortar PRAM-L (M1982),* *120 mm self-propelled mortar PRAM-S,* *120 mm mortar M38, M43* *and all 120 mm smoothbore mortars*

CARTRIDGE	
abbreviation	*120-EOFd-M*
average weight [*kg*]	*~16.50*
length [*mm*]	*720*
initial velocity of projectile (charge No. 1; 6) [$m.s^{-1}$]	*352*
maximum range (of fire) [*m*]	*8036*

PROJECTILE	
abbreviation	*120-OFd*
weight [*kg*]	*16.00*
length [*mm*]	*720*
type of explosives	*TNT/H/E*
weight of blasting filler [*kg*]	*2.66*
type of fuze	*MZ-81*

CHARGE	
abbreviation basic charge - OCHOB. "BC"	*NBL - 35*
propellant basic charge	*Ng pp-NBL 35*
weight propellant of basic charge [*g*]	*32*
supercharge - ДАЛЬН. "SC"	*1 pc*
height of "SC"[*mm*]	*~130*
diameter bundled "SC"[*mm*]	*~100*
propellant partial charge	*Nc 7p 4/7*
weight propellant of 1 pc partial charge [*g*]	*784*
total weight propellant "SC"[*g*]	*BC+SC = 816*

PACKING

Number of cartridges in the crate	*2*	**Weight of full crate [*kg*]**	*48.5*
Number of cartridges in the paper tube container	*1*	**Weight of full paper tube container [*kg*]**	*21.3*

DESCRIPTION

120-EOF is used to engage personnel, destroying gun positions, trenches and shelters. This projectile consists of a body (2), fuze (1), stabilizer (5), fins (6), and bursting charge (4).

COLOR and MARKING

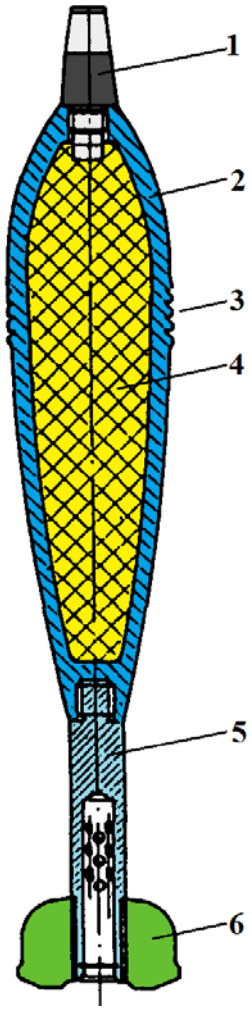
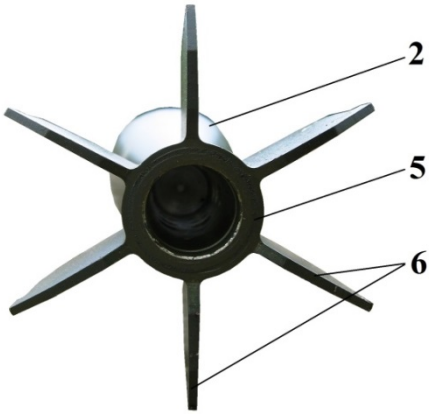
Body colour:	*Olive*
Text colour:	*Black*

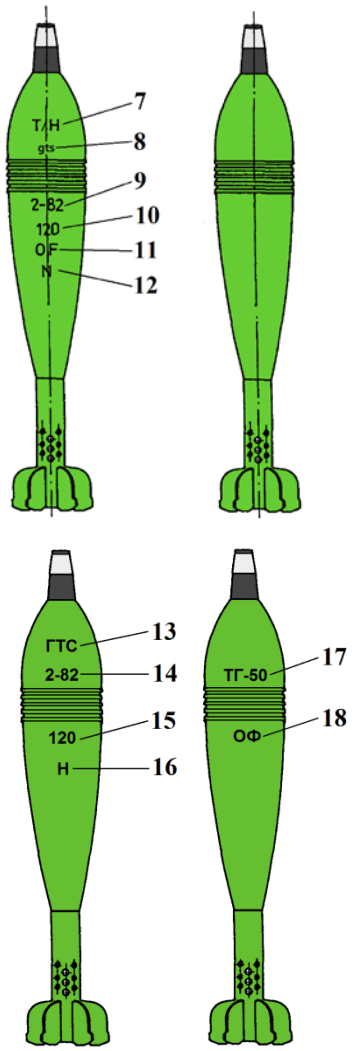
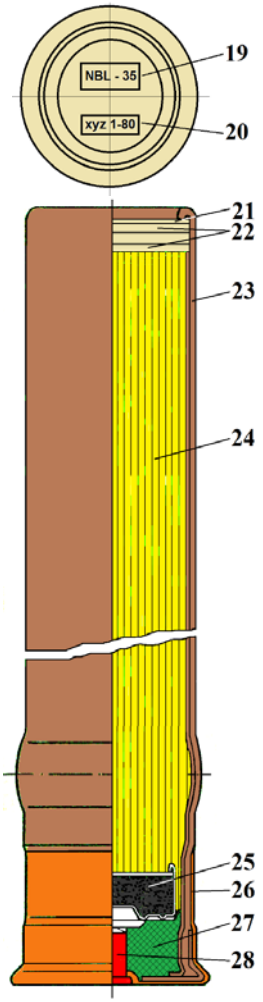
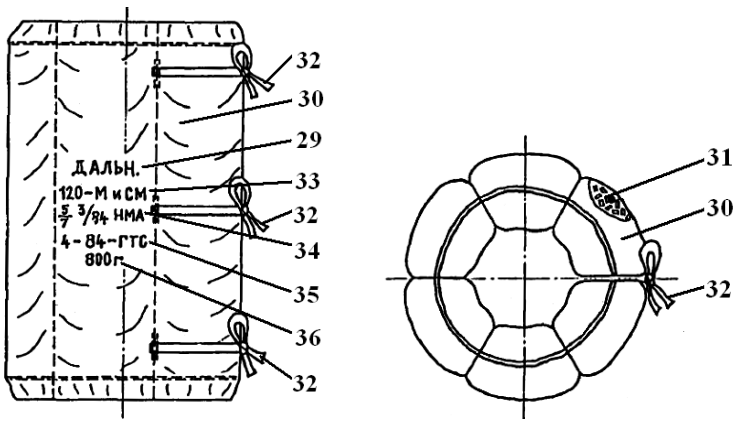
FUZE

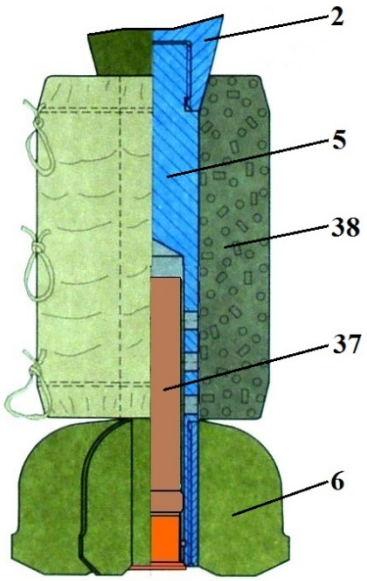
Type	Characteristic
MZ-81	*Fuze is nose, impact, with instantaneous and delay settings, safety provided by masking.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
 	*1 - Fuze;* *2 - Body;* *3 - Centring sealing collar (gas check)* *4 - Bursting charge;* *5 - Stabilizer;* *6 - Fins.*

PROJECTILE	BASIC CHARGE	LEGEND
	**Upper cover** 	*Projectile:* *7 - Type of explosive;* *8 - Index of manufacturer;* *9 - Series-year production of projectile;* *10 - Calibre;* *11 - Type of projectile;* *12 - Weight sign;* *13 - Index of manufacturer;* *14 - Series-year production of projectile;* *15 - Calibre;* *16 - Weight sign;* *17 - Type of explosive;* *18 - Type of projectile;* *Basic charge:* *19 - Marking of powder;* *20 - Index of manufacturer and series-year of propellant production;* *21 - Upper cover;* *22 - Covers;* *23 - Cartridge paper case;* *24 - Propellant;* *25 - Igniter;* *26 - Cartridge brass case;* *27 - Stopper;* *28 - Primer;*
SUPERCHARGE "ДАЛЬН."		
		*Supercharge:* *29 - Marking of „SC";* *30 - Textile sack;* *31 - Propellant (partial cut);* *32 - Fixing rope;* *33 - Calibre and type of weapon;* *34 - Propellant type and series/year of propellant production and marking of manufacturer;* *35 - Series-year of „SC" production and marking of manufacturer;* *36 - Weight of propellant in supercharges.*

LOCATION BASIC CHARGE AND SUPERCHARGE	LEGEND
	*2 - Body;* *5 - Stabilizer;* *6 - Fins;* *37 - Basic charge;* *38 – Supercharge.*

NOTICE
Stabilizer and fins are made from dural. Projectile has 6 stabilizing fins (6).

FWP Ammunition

ANNEX C-85

FIELD of AMMUNITION	*artillery*
CALIBER	*120 mm*
NAME	*120 mm High Explosive - Fragmentation - Mortar Bomb - Long-range*
TYPE	*HE-FRAG-LR*
NAME/ASSIGNED MARK (original)	*ОФ-843Б*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD;	*Fired by* *120 mm mortar PRAM-L (M1982),* *120 mm self-propelled mortar PRAM-S,* *120 mm mortar M38, M43* *and all 120 mm smoothbore mortars*

CARTRIDGE	
abbreviation	*53-ОФ-843Б*
average weight [*kg*]	*~16.50*
length [*mm*]	*667*
initial velocity of projectile (charge No. 1; 6) [$m.s^{-1}$]	*335*
maximum range (of fire) [*m*]	*8036*

PROJECTILE	
abbreviation	*ОФ-843Б*
weight [*kg*]	*16.00*
length [*mm*]	*667*
type of explosives	*ТД-50*
weight of blasting filler [*kg*]	*1.4*
type of fuze	*M-12*

CHARGE	
abbreviation basic charge - OCHOB. "BC"	*NBL - 35*
propellant basic charge	*Ng pp-NBL 35*
weight propellant of basic charge [*g*]	*32*
supercharge - ДАЛЬН. "SC"	*1 pc*
height of "SC"[*mm*]	*~130*
diameter bundled "SC"[*mm*]	*~100*
propellant partial charge	*Nc 7p 4/7*
weight propellant of 1 pc partial charge [*g*]	*784*
total weight propellant "SC"[*g*]	*BC+SC = 816*

PACKING

Number of cartridges in the crate	*2*	**Weight of full crate [*kg*]**	*48.5*
Number of cartridges in the paper tube container	*1*	**Weight of full paper tube container [*kg*]**	*21.3*

DESCRIPTION

120-EOF is used to engage personnel, destroying gun positions, trenches and shelters. This projectile consists of a body (2), fuze (1), stabilizer (5), fins (6), and bursting charge (4).

COLOR and MARKING

Body colour:	*Grey*	**Text colour:**	*Black*

FUZE

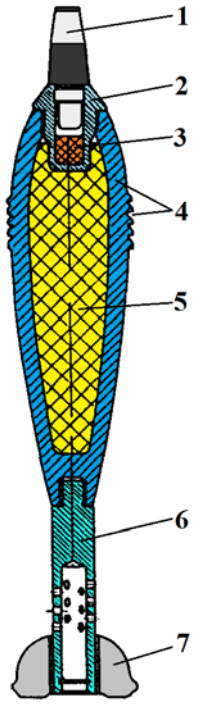
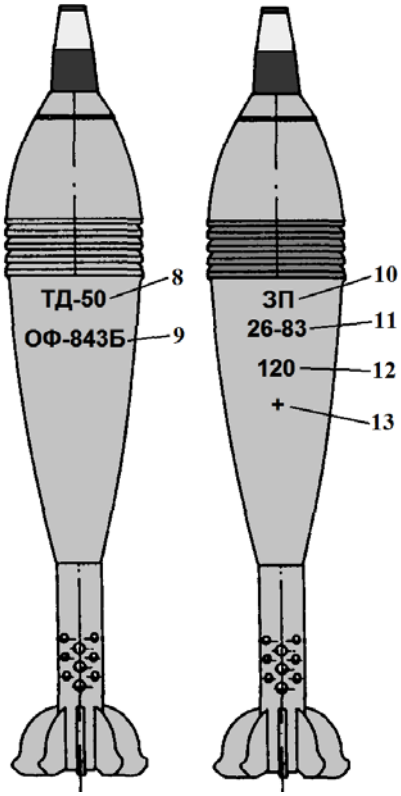
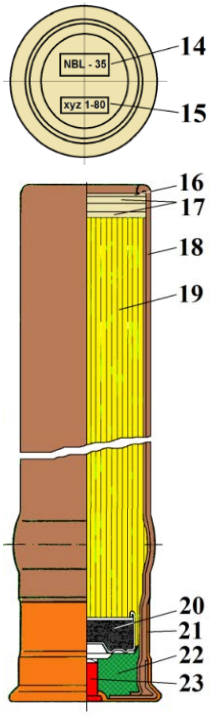
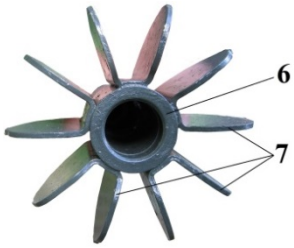
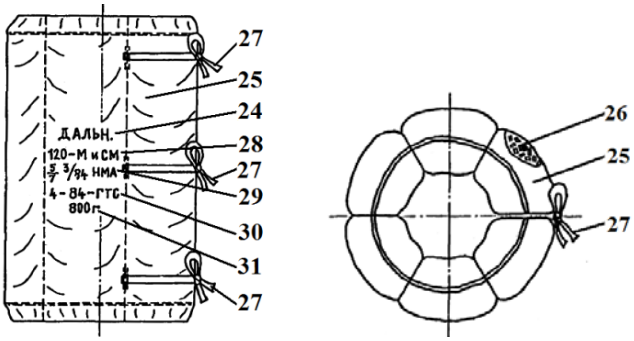
Type	Characteristic
M-12	*Fuze is nose, impact, with instantaneous and delay settings, safety provided by masking.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Charges are made in Slovakia (Czechoslovakia). Stabilizer and fins are made from iron. Projectile has 10 stabilizing fins (6).

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
		*1 - Fuze; 2 - Fuze adapter;* *3 - Booster charge;* *4 - Body with centring sealing collar (gas check);* *5 - Bursting charge;* *6 - Stabilizer;* *7 - Fins;* *8 - Type of explosive;* *9 - Type of projectile;* *10 - Index of manufacturer;* *11 - Series-year production of projectile;* *12 - Calibre; 13 - Weight sign;* *<u>Basic charge</u>:* *14 - Marking of powder;* *15 - Index of manufacturer and series-year of propellant production; 16 - Upper cover;* *17 - Covers; 18 - Cartridge paper case; 19 - Propellant;* *20 - Igniter; 21 - Cartridge brass case; 22 - Stopper; 23 - Primer;* *<u>Supercharge</u>:* *24 - Marking of „SC“;* *25 - Textile sack;* *26 - Propellant (partial cut);* *27 - Fixing rope;* *28 - Calibre and type of weapon;* *29 - Propellant type and series/year of propellant production and marking of manufacturer;* *30 - Series-year of „SC“ production and marking of manufacturer;* *31 - Weight of propellant in supercharges.*
BASIC CHARGE	**FINS STABILIZER**	
		
	SUPERCHARGE “ДАЛЬН.”	
		

	FWP Ammunition	**ANNEX C-86**

FIELD of AMMUNITION	*artillery*
CALIBER	*240 mm*
NAME	*240 mm High Explosive Mortar Bomb with Bags Charge*
TYPE	*HE*
NAME/ASSIGNED MARK (original)	*ВФ-864*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *240 mm Self-propelled Mortar 2S4 (240 M 2S4)* *240 mm Mortar M-240*

CARTRIDGE		PROJECTILE		PROPELLANT CHARGE	
abbreviation	*ВФ-864*	**abbreviation**	*Ф-864*	**abbreviation**	*3Н-864 (Bags Charge)*
average weight [*kg*]	*131.73-132.97*	**weight [*kg*]**	*130.70*	**basic charge**	*НБЛ 120*
		length [*mm*]	*1536*	**bags charge (3 pcs)**	*НБПл 55-50*
length [*mm*]	*1536*	**type of explosives**	*TNT*	**weight of basic charge [*kg*]**	*0.41*
initial velocity of projectile (charge No. 1; 2; 3) [$m.s^{-1}$]	*158; 204; 242*	**weight of blasting filler [*kg*]**	*31.90*	**weight of bags charge [*kg*] (charge No. 1; 2; 3)**	*0.62; 1.24; 1.86*
		type of fuze	*ГВМЗ, М-16*		
maximum range (of fire) [*m*]	*5290*			**weight of charges (No 1; 2; 3) [*kg*]**	*1.03; 1.65; 2.27*
				type of primer	*КВ-4*

PACKING			
Number of shell in the crate	*1*	**Weight of full crate with shell[*kg*]**	*185*
Number of bag charges in the crate	*12*	**Weight of full crate [*kg*]**	*67*

DESCRIPTION

Ф-864 is used to engage tanks and armoured vehicles, personnel, destroying gun positions, trenches and shelters. This projectile consists of a body (10), fuze (2), stabilizer (13), fins (15), bursting charge (8) and basic charge (14).

COLOR and MARKING

Body colour:	*Grey*
Text colour:	*Black*

FUZE

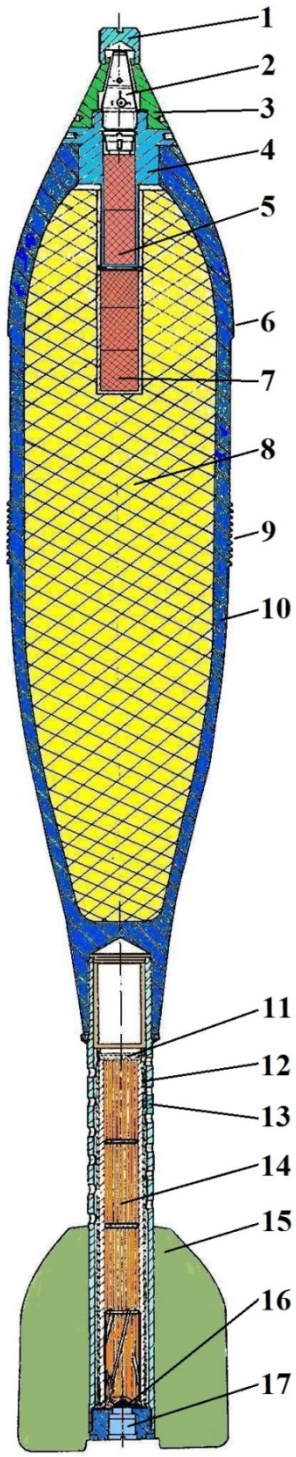
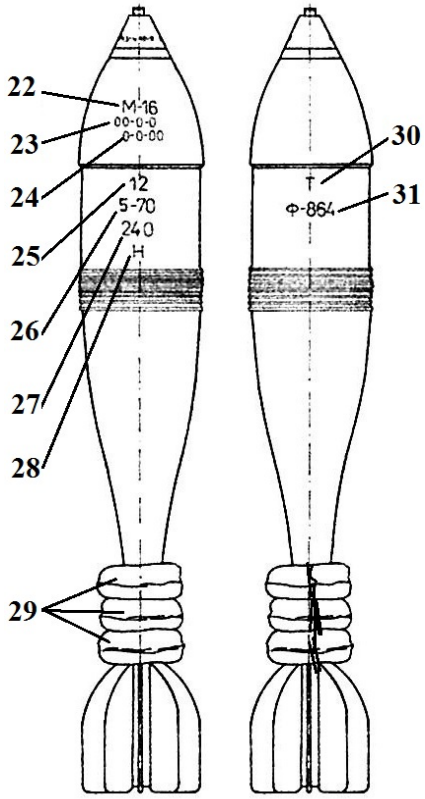
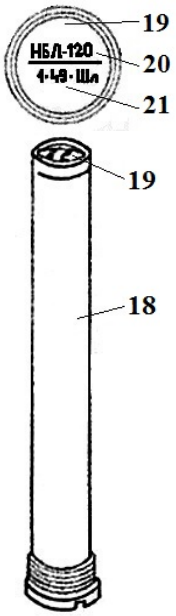
Type	Characteristic
ГВМЗ-7, М-16	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. Fuzes have adjustable delay and held detonator and provide muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Ф-864 is used without „small protective cover“ (1). Projectile has 10 stabilizing fins (15).

DRAWINGS/CUTAWAY/MARKING/STENCILING			LEGEND
			*1 - Small protective cover;* *2 - Fuze;* *3 - Big protective cover;* *4 - Detonation holster;* *5 - Lead charge - tetryl;* *6 - Centring collar;* *7 - Initiating explosive;* *8 - Bursting charge;* *9 - Centring sealing collar (gas check);* *10 - Body;* *11 - Cover;* *12 - Case;* *13 - Stabilizer;* *14 - Basic charge;* *15 - Fins;* *16 - Igniter;* *17 - Primer* *18 - Basic charge;* *19 - Cover;* *20 - Type of propellant of basic charge;* *21 - Series, year of manufacture of charge and marking of manufacturer* *22 -Type of fuze;* *23 - Series, year of manufacture and code manufacturer of fuze;* *24 - Symbol of filling factory of fuze;* *25 - Symbol of filling factory of projectile;* *26 - Series, year of manufacture of projectile;* *27 - Calibre;* *28 - Weight sign;* *29 - Bags charge;* *30 - Type of explosive;* *31 - Type of projectile: "Ф-864";*
	BASIC CHARGE	**BAG CHARGE**	
			

	FWP Ammunition	ANNEX C-87

FIELD of AMMUNITION	*artillery*
CALIBER	*240 mm*
NAME	*240 mm High Explosive Mortar Bomb with Supercharge*
TYPE	*HE*
NAME/ASSIGNED MARK (original)	*ВФ-864*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *240 mm Self-propelled Mortar 2S4 (240 M 2S4)* *240 mm Mortar M-240*

CARTRIDGE	
abbreviation	*ВФ-864*
average weight [*kg*]	*134.86*
length [*mm*]	*1536*
initial velocity of projectile [$m.s^{-1}$]	*310*
maximum range (of fire) [*m*]	*8050*

PROJECTILE	
abbreviation	*Ф-864*
weight [*kg*]	*130.70*
length [*mm*]	*1536*
type of explosives	*TNT*
weight of blasting filler [*kg*]	*31.90*
type of fuze	*ГВМЗ-7, М-16*

PROPELLANT CHARGE	
abbreviation	*ЗН-864 (Supercharge)*
basic charge	*НБЛ 120*
supercharge	*НБПл 175-50*
weight of basic charge [*kg*]	*0.41*
weight of supercharge [*kg*]	*3.75*
weight of filling [*kg*]	*4.16*
type of primer	*КВ-4*

PACKING			
Number of shell in the crate	*1*	**Weight of full crate with shell[*kg*]**	*185*
Number of bag charges in the crate	*8*	**Weight of full crate [*kg*]**	*70*

DESCRIPTION

Ф-864 is used to engage tanks and armoured vehicles, personnel, destroying gun positions, trenches and shelters. This projectile consists of a body (10), fuze (2), stabilizer (13), fins (15), bursting charge (8) and basic charge (14).

COLOR and MARKING

Body colour:	*Gray*
Text colour:	*Black*

FUZE

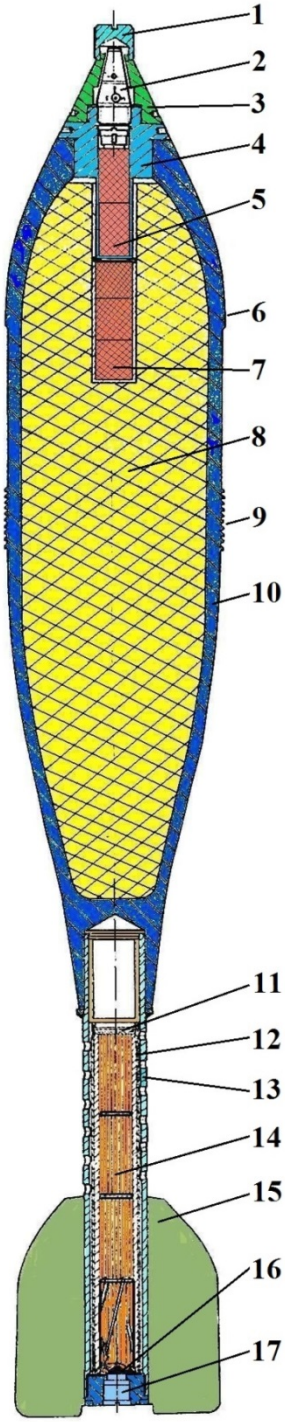
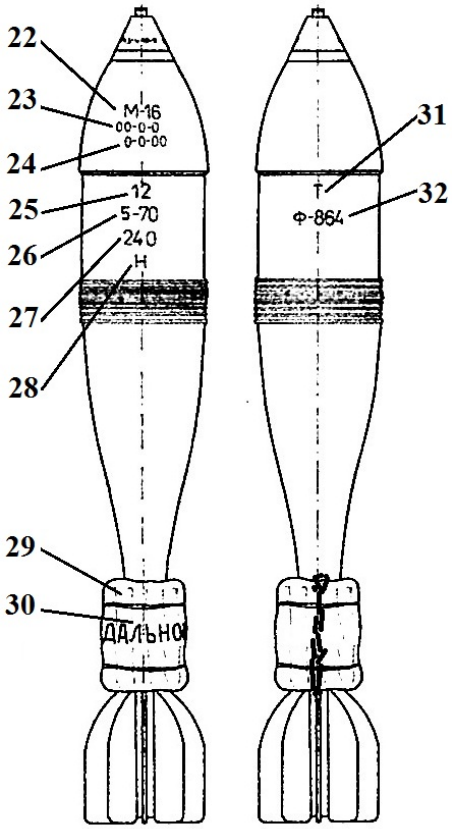
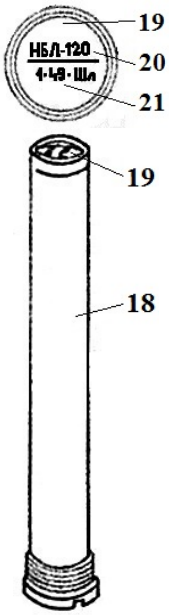
Type	Characteristic
ГВМЗ-7, М-16	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. Fuzes have adjustable delay and held detonator and provide muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Ф-864 is used without „small protective cover“(1).

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
		*1 - Small protective cover;* *2 - Fuze;* *3 - Big protective cover;* *4 - Detonation holster;* *5 - Lead charge - tetryl;* *6 - Centring collar;* *7 - Initiating explosive;* *8 - Bursting charge;* *9 - Centring sealing collar;* *10 - Body;* *11 - Cover;* *12 - Case;* *13 - Stabilizer;* *14 - Basic charge;* *15 - Fins;* *16 - Igniter;* *17 - Primer* *18 - Basic charge;* *19 - Cover;* *20 - Type of propellant of basic charge;* *21 - Series, year of manufacture of charge and marking of manufacturer* *22 -Type of fuze;* *23 - Series, year of manufacture and code manufacturer of fuze; 24 - Symbol of filling factory of fuze;* *25 - Symbol of filling factory of projectile;* *26 - Series, year of manufacture of projectile;* *27 - Calibre;* *28 - Weight sign;* *29 - Bag charge;* *30 - The inscription with the type of charge* *"ДАЛЬНОБОЙНЫЙ" = "Supercharge"* *31 - Type of explosive;* *32 - Type of projectile: "Ф-864".*
	BASIC CHARGE	**SUPERCHARGE**
		

	FWP Ammunition	ANNEX C-88

FIELD of AMMUNITION	*artillery*
CALIBER	*240 mm*
NAME	*240 mm High Explosive Mortar Bomb with Special charge*
TYPE	*HE*
NAME/ASSIGNED MARK (original)	*ВФ-864*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*Fired by* *240 mm Self-propelled Mortar 2S4 (240 M 2S4)* *240 mm Mortar M-240*

CARTRIDGE		PROJECTILE		PROPELLANT CHARGE	
abbreviation	*ВФ-864*	**abbreviation**	*Ф-864*	**abbreviation**	*3Н-864А (Special charge)*
average weight [*kg*]	*136.81*	**weight [*kg*]**	*130.70*	**basic charge**	*НБЛ 120*
		length [*mm*]	*1536*	**special charge**	*НБПл 220-100*
length [*mm*]	*1536*	**type of explosives**	*TNT*	**weight of basic charge [*kg*]**	*0.41*
initial velocity of projectile [$m.s^{-1}$]	*362*	**weight of blasting filler [*kg*]**	*31.90*	**weight of special charge [*kg*]**	*5.70*
		type of fuze	*ГВМЗ-7, М-16*	**weight of filling [*kg*]**	*6.11*
maximum range (of fire) [*m*]	*9700*			**type of primer**	*КВ-4*

PACKING			
Number of shell in the crate	*1*	**Weight of full crate with shell[*kg*]**	*185*
Number of bag charges in the crate	*8*	**Weight of full crate [*kg*]**	*71*

DESCRIPTION

Ф-864 is used to engage tanks and armoured vehicles, personnel, destroying gun positions, trenches and shelters. This projectile consists of a body (10), fuze (2), stabilizer (13), fins (15), bursting charge (8) and basic charge (14).

COLOR and MARKING

Body colour:	*Grey*
Text colour:	*Black*

FUZE

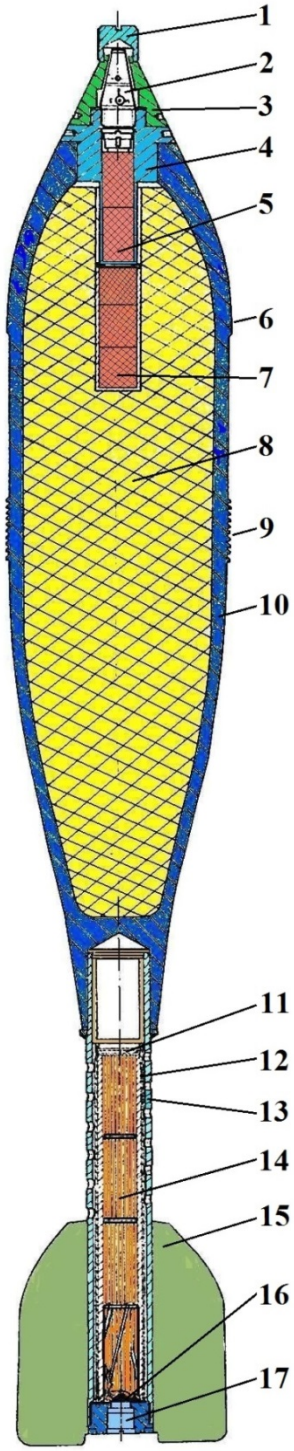
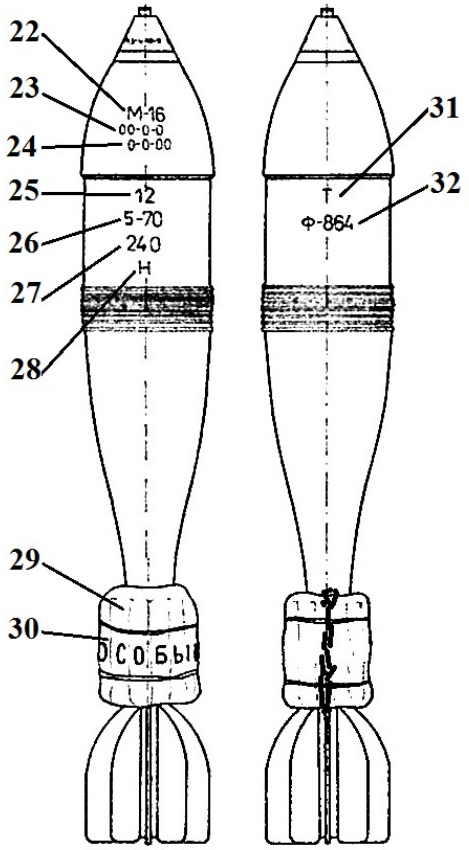
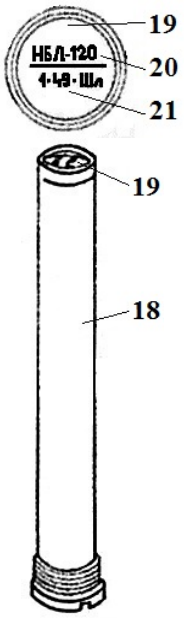
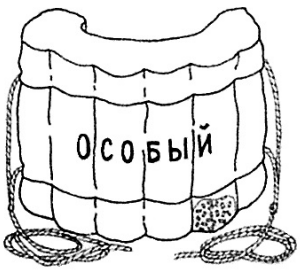
Type	Characteristic
ГВМЗ-7 *М-16*	*It is screwed into the nose of the shell and is armed by the inertial forces acting on the shot. Fuzes have adjustable delay and held detonator and provide muzzle safety.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded projectile.

NOTICE

Ф-864 is used without „small protective cover“(1).

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
		*1 - Small protective cover;* *2 - Fuze;* *3 - Big protective cover;* *4 - Detonation holster;* *5 - Lead charge - tetryl;* *6 - Centring collar;* *7 - Initiating explosive;* *8 - Bursting charge;* *9 - Centring sealing collar (gas check);* *10 - Body;* *11 - Cover;* *12 - Case;* *13 - Stabilizer;* *14 - Basic charge;* *15 - Fins;* *16 - Igniter;* *17 - Primer* *18 - Basic charge;* *19 - Cover;* *20 - Type of propellant of basic charge;* *21 - Series, year of manufacture of charge and marking of manufacturer* *22 -Type of fuze;* *23 - Series, year of manufacture and code manufacturer of fuze; 24 - Symbol of filling factory of fuze;* *25 - Symbol of filling factory of projectile;* *26 - Series, year of manufacture of projectile;* *27 - Calibre;* *28 - Weight sign;* *29 - Bag charge;* *30 - The inscription of the type of charge "ОСОБЫЙ" = "Special charge"* *31 - Type of explosive;* *32 - Type of projectile: "Ф-864".*
BASIC CHARGE	**SPECIAL CHARGE**	
		

	FWP Ammunition	ANNEX C-89

FIELD of AMMUNITION	*infantry*
NAME	*Offensive Hand Grenade*
NAME/ASSIGNED MARK (original)	*RG-4*
COUNTRY of ORIGIN	*Czechoslovakia*

GRENADE RG-4

abbreviation	*RG-4*	**explosive type**	*TNT*
length/diameter [*mm*]	*84/53*	**weight of explosive [*kg*]**	*0.110*
weight [*kg*]	*0.322*	**weight of reinforcing case [*kg*]**	*0.125*

PACKING

Number of rounds in the crate	*25*	**Weight of full crate [*kg*]**	*12*

DESCRIPTION

RG-4 is used to engage unprotected enemy and enemy in the trenches. This grenade consists of a jacket (2) and cover (1), initiation striker (4), needle striker (6) and explosive charges (3).

COLOR and MARKING

Body colour:	*Black*
Text colour:	*Older production - red* *Newer production - white*

FUZE

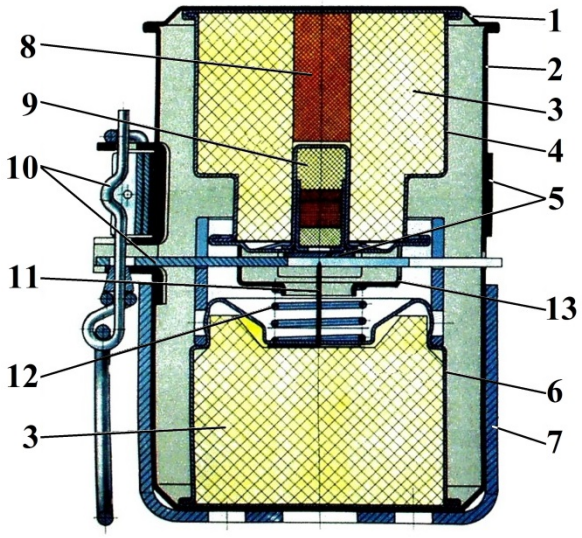
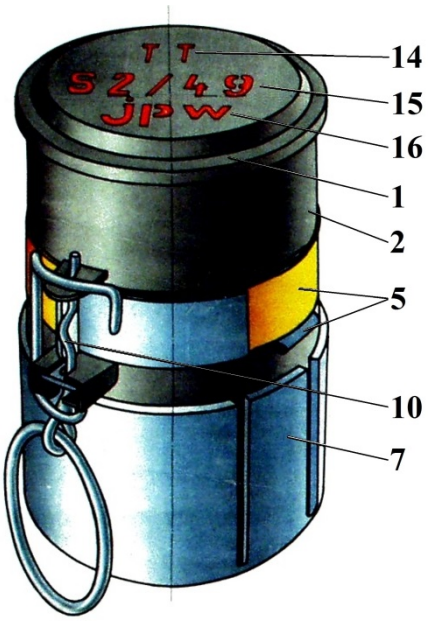
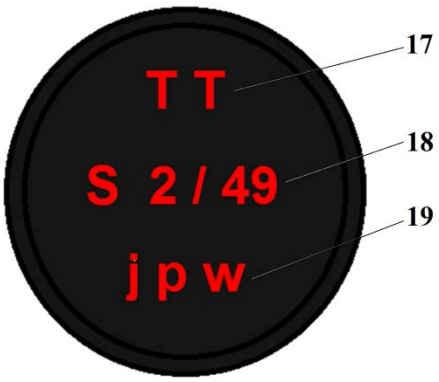
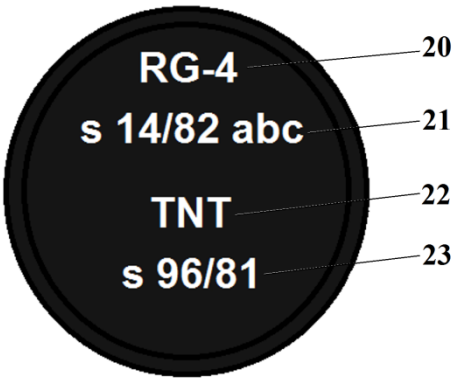
Type	Characteristic
---	*Built-in initiation mechanism.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded grenade.

NOTICE

RG-4 is used normally without the fragmentation case. The fragmentation case is used sporadically only.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
   	*1 - Cover;* *2 - Jacket of grenade;* *3 - Explosive charges;* *4 - Initiation striker;* *5 - Safety lever - Securing belt;* *6 - Needle striker;* *7 - Fragmentation case;* *8 - Booster charge;* *9 - Combined detonator;* *10 - Transport safety pin;* *11 -Needle;* *12 - Spring;* *13 - Supporting bridge;* *14 - Explosive type;* *15 - Series-year of completion;* *16 - Index of filling factory;* *<u>Older production - red inscriptions</u>:* *17 - Explosive type;* *18 - Series/year of completion;* *19 - Index of filling factory;* *<u>Newer production - white inscriptions</u>:* *20 - Type of grenade;* *21 - Series/year of completion and index of filling factory;* *22 - Type of explosive;* *23 - Series/year of explosive production.*

	FWP Ammunition	**ANNEX C-90**

FIELD of AMMUNITION	*infantry*
NAME	*Defensive Hand Grenade*
NAME/ASSIGNED MARK (original)	*RG-F1*
COUNTRY of ORIGIN	*Czechoslovakia*

GRENADE

abbreviation	*RG-F1*	**explosive type**	*TNT*
length [*mm*]	*86*	**weight of explosive [*kg*]**	*0.050 - 0.056*
diameter [*mm*]	*55*	**type of fuze**	*UZRGM*
weight (with fuze) [*kg*]	*~0.600*	**length of fuze [*mm*]**	*99 - 104*
		weight of fuze [*kg*]	*0.051*

PACKING

Number of rounds in the crate	*20*	**Weight of full crate [*kg*]**	*18*

DESCRIPTION

RG-F1 is used to engage unprotected enemy and enemy in the trenches. This grenade consists of a fuze (1) body (4) and explosive charge (5).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

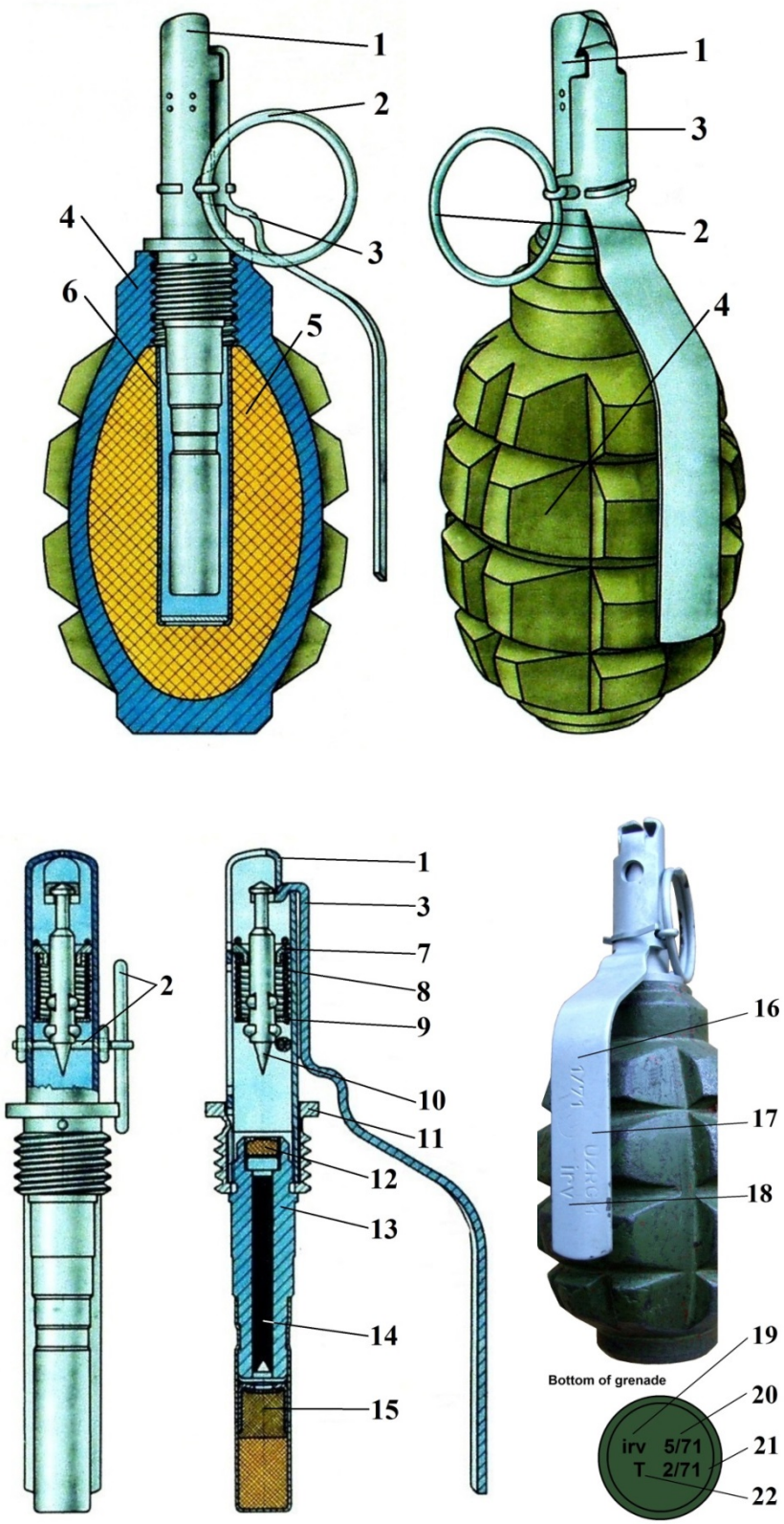
Type	**Characteristic**
UZRGM	*Time delay fuze. Activates when grenade is thrown.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded grenade. If, after throwing, the fuze is unscrewed and not present the grenade body can be moved.

NOTICE

The fuze is made of iron - surface protection zinc.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Fuze;* *2 - Transport safety pin;* *3 - Fly off lever;* *4 - Body;* *5 - Explosive charge;* *6 - Cardboard case;* *7 - Guiding pad;* *8 - Striker spring* *9 - Pad;* *10 - Striker;* *11 - Connecting case with thread;* *12 - Flash initiator;* *13 - Body of timer;* *14 - Timer;* *15 - Detonator;* *<u>Stamped marks on the fuze</u>:* *16 - Series/year of fuze completion;* *17 - Fuze type „UZRGM“;* *18 - Index of completing factory;* *<u>Painted signs on the grenade bottom</u>:* *19 - Index of filling factory;* *20 - Series/year of grenade completion;* *21 - Series/year of manufacture explosive;* *22 - Type of explosive.*

	FWP Ammunition	ANNEX C-91

FIELD of AMMUNITION	*infantry*
NAME	*Universal Hand Grenade*
NAME/ASSIGNED MARK (original)	*URG-86*
COUNTRY of ORIGIN	*Czechoslovakia*

GRENADE

abbreviation	*URG-86*	**weight of explosive [*kg*]**	*0.043*
length [*mm*]	*117*	**weight fragments [*kg*]**	*0.190*
diameter [*mm*]	*60*	**the number of fragments [*pcs*]**	*1900*
weight (with fuze) [*kg*]	*~0.440*	**weight fragment [*g*]**	*0.1*
explosive type	*plastic explosive*	**type of fuze**	*ZK*

PACKING

Number of rounds in the crate	*20*	**Weight of full crate [*kg*]**	*15*

DESCRIPTION

URG-86 is defence and offensive type. Grenade is used for engaging unprotected enemy and enemy in the trenches. This grenade consists of a body (1), explosive charge (2) and fuze (11).

COLOR and MARKING

Body colour:	*Fuze - olive,* *Grenade - olive*
Text colour:	*Black and stamped*

FUZE

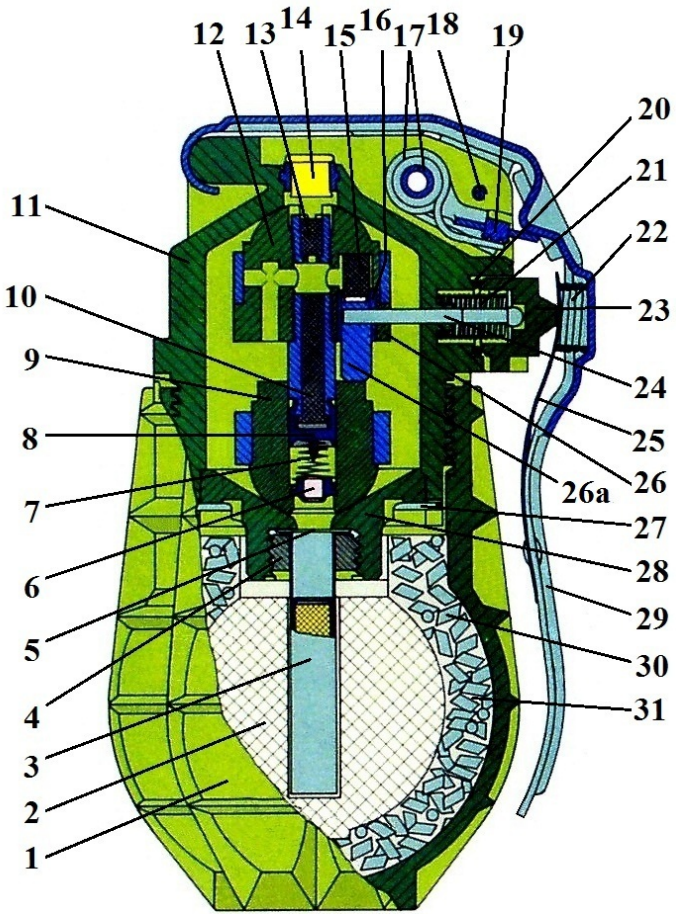
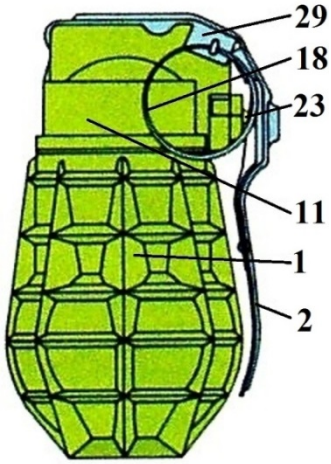
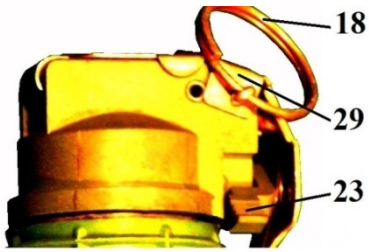
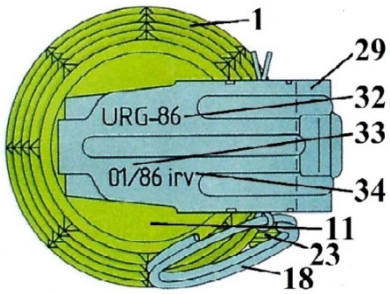
Type	**Characteristic**
ZK	*Time delay fuze. Fuze functions when the grenade impacts an obstacle or after a delay. Fuze arms on throwing of the grenade.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded grenade.

NOTICE

The transport safety pin and the fly off lever of the fuze are made of iron - surface protection zinc.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
   	*1 - Body of grenade;* *2 - Explosive charge;* *3 - Detonator;* *4 - Screw of detonator;* *5 - Cover;* *6 - Flash initiator;* *7 - Striker spring;* *8 - Striker;* *9 - Bottom inertia striker;* *10 - Timer;* *11 - Body of fuze;* *12 - Upper inertia striker;* *13 - Pyrotechnic timer;* *14 - Primer;* *15 - Pyrotechnic locking part;* *16 - Damping insert;* *17 - Torsion spring and hollow pin;* *18 - Transport safety pin;* *19 - Striker;* *20 - Sealing ring;* *21 - Spring;* *22 - Spring;* *23 - Adjustable lever;* *24 - Lock pin;* *25 - Abutment spring;* *26 - Case;* *26a - Spacer pin;* *27 - Locking part;* *28 - Rack of detonator;* *29 - Fly off lever - throwing fuze;* *30 - Fragment;* *31 - Fragmentation insert;* *<u>On upper part the fly off lever</u>:* *29 - Fly off lever - throwing fuze;* *32 - Type of grenade; but also "RG-86"* *33 - Series/year of grenade completion;* *34 - Index of completing factory.*

	FWP Ammunition	ANNEX C-92

FIELD of AMMUNITION	*infantry*
CALIBER	*30 mm*
NAME	*Grenade*
TYPE	*30x29B*
NAME/ASSIGNED MARK (original)	*ВОГ-17, ВОГ-17М*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*АГС-17, АГ-17А, АГС-30 (USSR)* *RAG-30 (Slovakia)*

GRENADE

abbreviation	*ВОГ-17 or ВОГ-17А*	*ВОГ-17М*
length of cartridge [*mm*]	*132*	*132*
length of projectile [*mm*]	*113*	*113*
length of cartridge case [*mm*]	*28*	*28*
weight of cartridge [*kg*]	*0.35*	*0.348*
weight of projectile [*kg*]	*0.28*	*0.275*
type of explosive	*A-IX-1*	*A-IX-1*
weight of explosive [*kg*]	*0.036*	*0.034*
type of fuze	*ВМГ*	*ВМГ-М*
type of primer	*KVM-3*	*KVM-3*
muzzle velocity [$m.s^{-1}$]	*185*	*185*
maximum range (of fire) [*m*]	*1700*	*1700*

PACKING

Number of rounds in the crate (36 pcs in metal box)	*3x36*	**Weight of full crate (3 pcs metal boxes in wooden case) [*kg*]**	*55*

DESCRIPTION

ВОГ-17, 17М and 30 is used for engaging unprotected enemy and enemy in the trenches. This grenade consists of a fuze (1) body (2) and explosive charge (3).

COLOR and MARKING

Body colour:	*Black*
Text colour:	*White*

FUZE

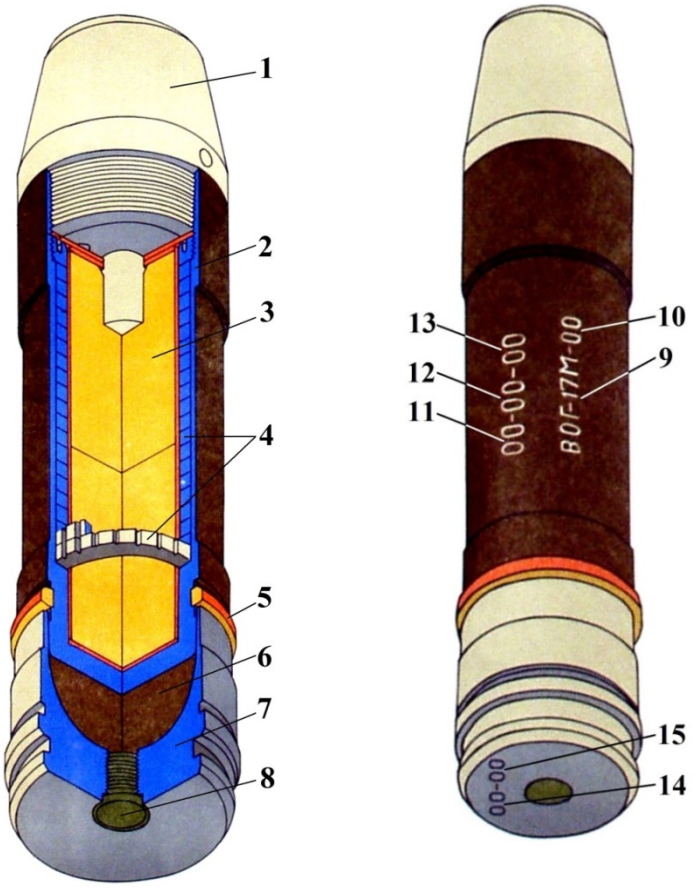
Type	**Characteristic**
ВМГ	*Fuze is nose, superquick and instantaneous.*
ВМГ-М	*Fuze is nose, superquick and instantaneous with self-destruct function.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded grenade.

NOTICE

ВОГ-17 and ВОГ-17М - splinter effect of projectile is provided by shaped steel wire.

DRAWINGS/CUTAWAY/MARKING/STENCILING:	LEGEND
	*1 - Fuze;* *2 - Body;* *3 - Booster charge;* *4 - Steel wire;* *5 - Driving band;* *6 - Propellant;* *7 - Cartridge case;* *8 - Primer;* *9 - Type of cartridge;* *10 - Type of explosive;* *11 - Marking of filling factory;* *12 - Marking of series manufacture;* *13 - Marking of year manufacture;* *14 - Marking of manufacturer of cartridge case;* *15 - Marking of year manufacture of cartridge case.*

	FWP Ammunition	ANNEX C-93

FIELD of AMMUNITION	*infantry*
CALIBER	*30 mm*
NAME	*Grenade*
TYPE	*30x29B*
NAME/ASSIGNED MARK (original)	*ВОГ-30*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*АГС-17, АГ-17А, АГС-30 (USSR)* *RAG-30 (Slovakia)*

GRENADE ВОГ-30

abbreviation	*ВОГ-30*
length of cartridge [*mm*]	*132*
length of projectile [*mm*]	*113*
length of cartridge case [*mm*]	*28*
weight of cartridge [*kg*]	*0.348*
weight of projectile [*kg*]	*0.275*
type of explosive	*A-IX-1*
weight of explosive [*kg*]	*0.040*
type of fuze	*ВМГ-М*
type of primer	*KVM-3*
muzzle velocity [$m.s^{-1}$]	*185*
maximum range (of fire) [*m*]	*1800*

PACKING

Number of rounds in the crate (36 pcs in metal box)	*3x36*	**Weight of full crate (3 pcs metal boxes in wooden case) [*kg*]**	*55*

DESCRIPTION

ВОГ-30 is used for engaging unprotected enemy and enemy in the trenches. This grenade consists of a fuze (1) body (2) and explosive charge (3).

COLOR and MARKING

Body colour:	*Black*
Text colour:	*White*

FUZE

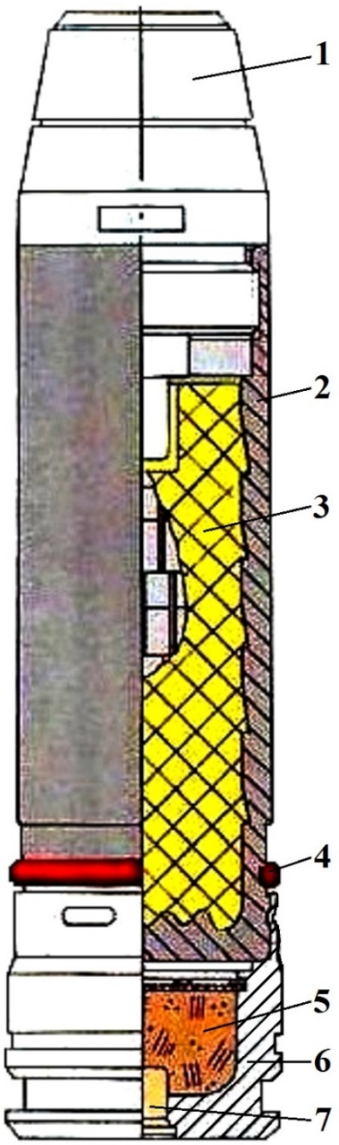
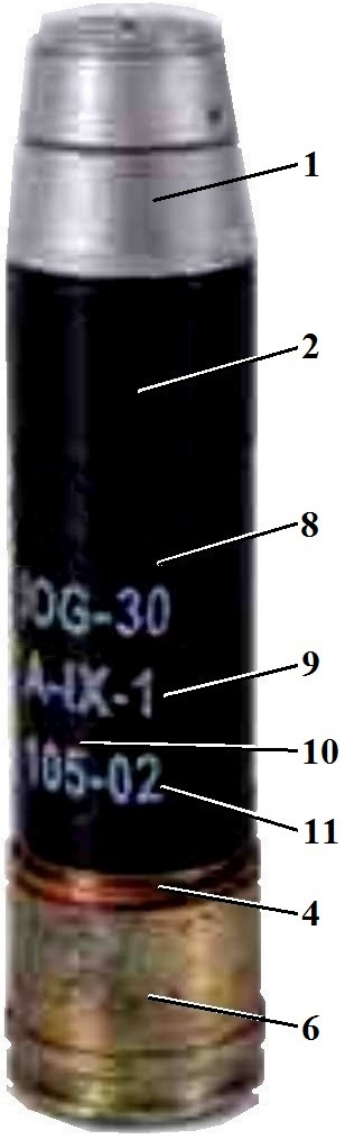
Type	Characteristic
ВМГ-М	*Fuze is nose, superquick and instantaneous with self-destruct function.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded grenade.

NOTICE

ВОГ-30 - splinter effect of projectile is provided by a pre-fragmented steel body using a special pattern of pressed cuts on the inner side of the body.

DRAWINGS/CUTAWAY/MARKING/STENCILING:	LEGEND
 	*1 - Fuze;* *2 - Body;* *3 - Booster charge;* *4 - Driving band;* *5 - Propellant;* *6 - Cartridge case;* *7 - Primer;* *8 - Type of cartridge;* *9 - Type of explosive;* *10 - Marking of series manufacture;* *11 - Marking of year manufacture;*

	FWP Ammunition	ANNEX C-94

FIELD of AMMUNITION	*infantry*
CALIBER	*30 mm*
NAME	*Grenade*
TYPE	*30x29B*
NAME/ASSIGNED MARK (original)	*ГПД-30*
COUNTRY of ORIGIN	*Union of Soviet Socialist Republics*
DEPLOYMENT METHOD	*АГС-17, АГ-17А, АГС-30 (USSR)* *RAG-30 (Slovakia)*

GRENADE ГПД-30	
abbreviation	*ГПД-30*
length of cartridge [*mm*]	*132*
length of projectile [*mm*]	*~120*
length of cartridge case [*mm*]	*28*
weight of cartridge [*kg*]	*0.34*
weight of projectile [*kg*]	*0.275*
type of explosive	*A-IX-1*
weight of explosive [*kg*]	*0.046*
type of fuze	*ВМГ-М*
type of primer	*KVM-3*
muzzle velocity [$m.s^{-1}$]	*185*
maximum range (of fire) [*m*]	*2200*

PACKING

Number of rounds in the crate (36 pcs in metal box)	*~3x36*	**Weight of full crate (3 pcs metal boxes in wooden case) [*kg*]**	*~55*

DESCRIPTION

ГПД-30 is used for engaging unprotected enemy and enemy in the trenches. This grenade consists of a fuze (1), body (2) and explosive charge (3).

COLOR and MARKING

Body colour:	*Grey*
Text colour:	---

FUZE

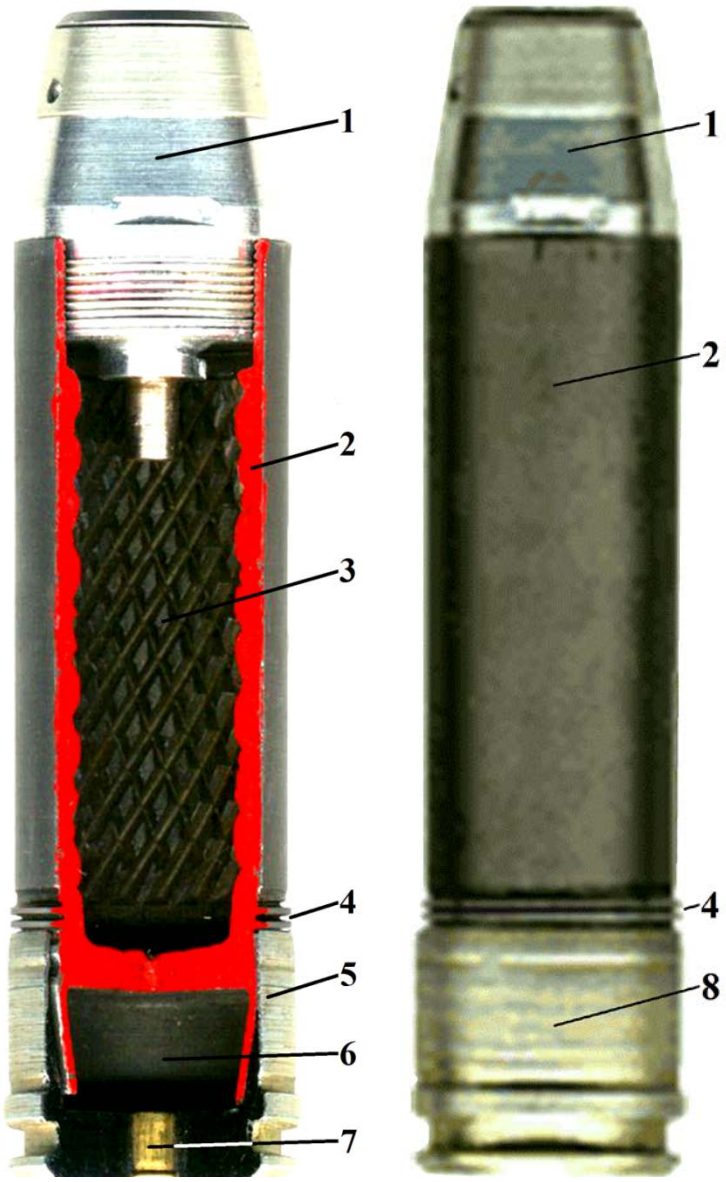
Type	**Characteristic**
ВМГ-М	*Fuze is nose, superquick and instantaneous with self-destruct function.*

SAFETY CONSIDERATION THREAT

Do not touch and do not move unexploded grenade.

NOTICE

ГПД-30 has double integral driving band created directly from the body of the grenade.

DRAWINGS/CUTAWAY/MARKING/STENCILING:	LEGEND
	*1 - Fuze;* *2 - Body;* *3 - Formed fragments and place for booster charge;* *4 - Driving band;* *5 - Cartridge case;* *6 - Place for propellant and the suction cavity probably;* *7 - Place for primer;* *8 - Cartridge case assembly.*

	FWP Ammunition	**ANNEX C-95**

FIELD of AMMUNITION	*Anti-Personnel Mine*
NAME	*Anti-Personnel Wooden Mine*
NAME/ASSIGNED MARK (original)	*PP Mi-D*
COUNTRY of ORIGIN	*Czechoslovakia*

PP Mi-D	
total weight of mine without detonators [*kg*]	*0.500*
explosive type	*TNT*
weight of explosive [*kg*]	*0.200*
length of mine [*mm*]	*135*
width of mine [*mm*]	*103*
height of mine [*mm*]	*54*
type of fuze	*Ro-1*
type of detonator	*Ž*
activation force by tripwire greater than [*N*]	*40*
mine resistance against overpressure in the shock wave [*MPa*]	*0.0108*

PACKING			
Number of mines in the crate	*40*	**Weight of full crate [*kg*]**	*7.3*

DESCRIPTION

PP Mi-D is used against personnel as a booby trap. This mine consists of a box (2), hinged lid (1), bursting charge (7) and fuze (5).

COLOR and MARKING	
Body colour:	*Brown*
Text colour:	---

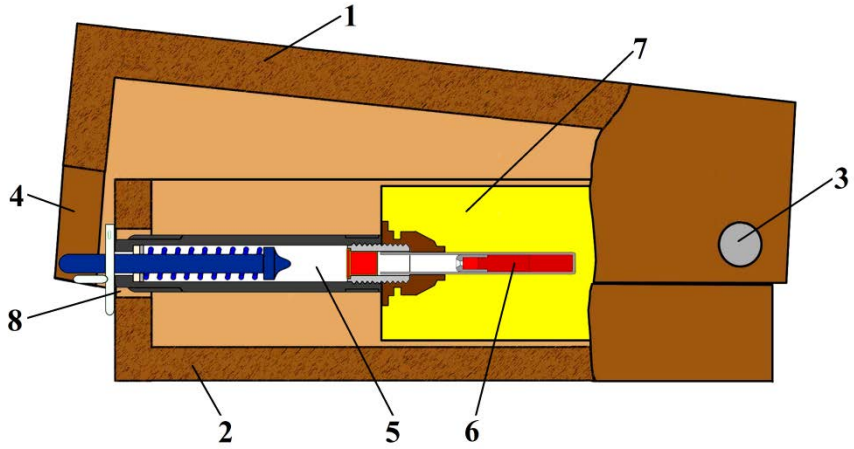
FUZE	
Type	**Characteristic**
Ro-1	*Metal fuze, mechanical, pressure and tension, with immediate effect.*

SAFETY CONSIDERATION THREAT

Mine is very sensitive. Removal of mines is very dangerous.

NOTICE

Anti-Personnel wooden mine, has the demolition block 200 g TNT which has dimensions 40x50x70 mm.
Mine wooden body is impregnated with preservative.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	1 - Hinged lid; *2 - Box for bursting charge;* *3 - Hinge nail;* *4 - Vertical cut-out;* *5 - Fuze - Ro-1;* *6 - Detonator;* *7 - Bursting charge - demolition block 200 g TNT;* *8 - Round hole;*
	

	FWP Ammunition	ANNEX C-96

FIELD of AMMUNITION	*Anti-Personnel Mine*
NAME	*Anti-Personnel Wooden Mine*
NAME/ASSIGNED MARK (original)	*PP Mi-D II*
COUNTRY of ORIGIN	*Czechoslovakia*

PP Mi-D II	
total weight of mine without detonators [*kg*]	*0.500*
explosive type	*TNT*
weight of explosive [*kg*]	*0.200*
length of mine [*mm*]	*185*
width of mine [*mm*]	*80*
height of mine [*mm*]	*45*
type of fuze	*Ro-1*
type of detonator	*Ž*
activation force by tripwire greater than [*N*]	*40*
mine resistance against overpressure in the shock wave [*MPa*]	*0.0108*

PACKING

Number of mines in the crate	*20*	**Weight of full crate [*kg*]**	*9.4*

DESCRIPTION

PP Mi-D II is used against personnel as a booby trap. This mine consists of a box (2), hinged lid (1), bursting charge (7) and fuze (5).

COLOR and MARKING

Body colour:	*Brown*
Text colour:	---

FUZE

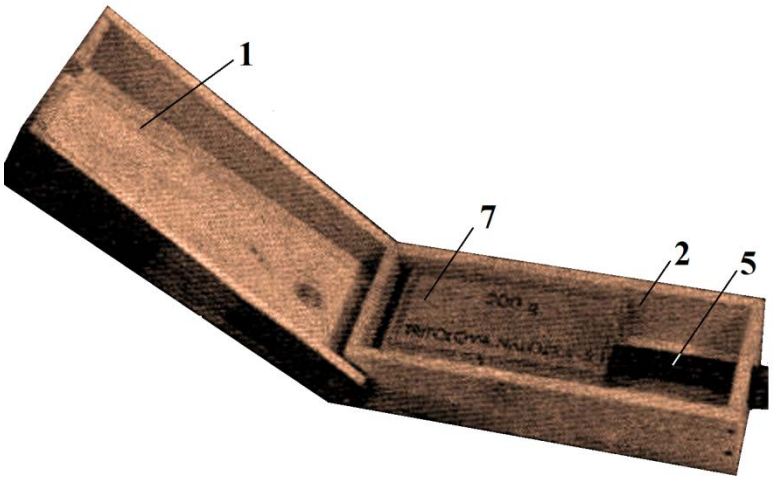
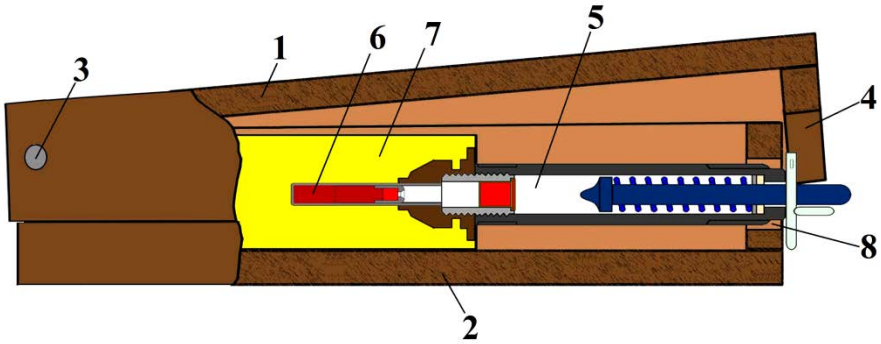
Type	**Characteristic**
Ro-1	*Metal fuze, mechanical, pressure and tension, with immediate effect.*

SAFETY CONSIDERATION THREAT

Mine is very sensitive. Removal of mines is very dangerous.

NOTICE

Anti-Personnel wooden mine, has the demolition block 200 g TNT which has dimensions 25x50x100 mm.
Mine wooden body is impregnated with preservative.

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	1 - Hinged lid; *2 - Box for bursting charge;* *3 - Hinge nail;* *4 - Vertical cut-out;* *5 - Fuze - Ro-1;* *6 - Detonator;* *7 - Bursting charge - demolition block 200 g TNT;* *8 - Round hole.*
	
	

	FWP Ammunition	**ANNEX C-97**

FIELD of AMMUNITION	*Anti-Personnel Mine*
NAME	*Anti-Personnel Fragmentation Steel Mine*
NAME/ASSIGNED MARK (original)	*PP Mi-Sk*
COUNTRY of ORIGIN	*Czechoslovakia*

PP Mi-Sk	
total weight of mine without detonators [*kg*]	*1.60*
explosive type	*TNT*
weight of explosive [*kg*]	*0.075*
diameter mine [*mm*]	*60*
height of mine [*mm*]	*137*
type of fuze	*Ro-1; Ro-10*
type of detonator	*Ž*
activation force by tripwire (mine with fuze Ro-1 or Ro-10) greater than [*N*]	*40*
mine resistance against overpressure in the shock wave (mine with fuze Ro-1 or Ro-10) [*MPa*]	*~0.01*

PACKING

Number of mines in the crate	*10*	**Weight of full crate [*kg*]**	*21*

DESCRIPTION

PP Mi-Sk is used against personnel as a booby trap. This mine consists of a fuze (1), steel body (2) and bursting charge (4).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	---

FUZE

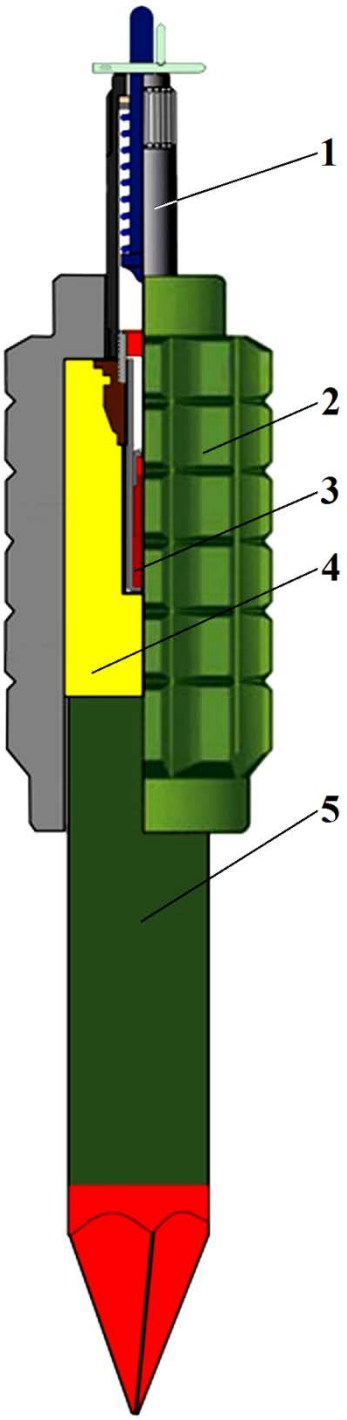
Type	**Characteristic**
Ro-1; Ro-10	*Metal fuze, mechanical, pressure and tension, with immediate effect.*

SAFETY CONSIDERATION THREAT

Mine is very sensitive. Removal of mines is very dangerous.

NOTICE

Anti-Personnel metallic mine, has the body made of cast-iron.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
		*1 - Fuze - Ro-1;* *2 - Body;* *3 - Detonator;* *4 - Bursting charge - demolition block 75 g TNT;* *5 - Wooden peg.*

	FWP Ammunition	ANNEX C-98

FIELD of AMMUNITION	*Anti-Personnel Mine*
NAME	*Anti-Personnel Fragmentation Concrete Mine*
NAME/ASSIGNED MARK (original)	*PP Mi-Sb*
COUNTRY of ORIGIN	*Czechoslovakia*

PP Mi-Sb	
total weight of mine without detonators [*kg*]	*2.10*
explosive type	*TNT*
weight of explosive [*kg*]	*0.075*
diameter mine [*mm*]	*75*
height of mine [*mm*]	*140*
type of fuze	*Ro-1; Ro-10*
type of detonator	*Ž*
activation force by tripwire (mine with fuze Ro-1 or Ro-10) greater than [*N*]	*40*
mine resistance against overpressure in the shock wave (mine with fuze Ro-1 or Ro-10) [*MPa*]	*~0.01*

PACKING			
Number of mines in the crate	*8*	**Weight of full crate [*kg*]**	*21*

DESCRIPTION

PP Mi-Sb is used against personnel as a booby trap. This mine consists of a fuze (1), concrete body (2) and bursting charge (4).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	---

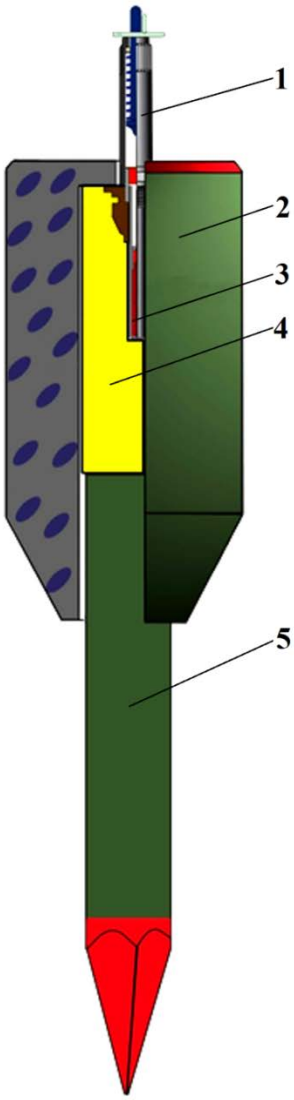
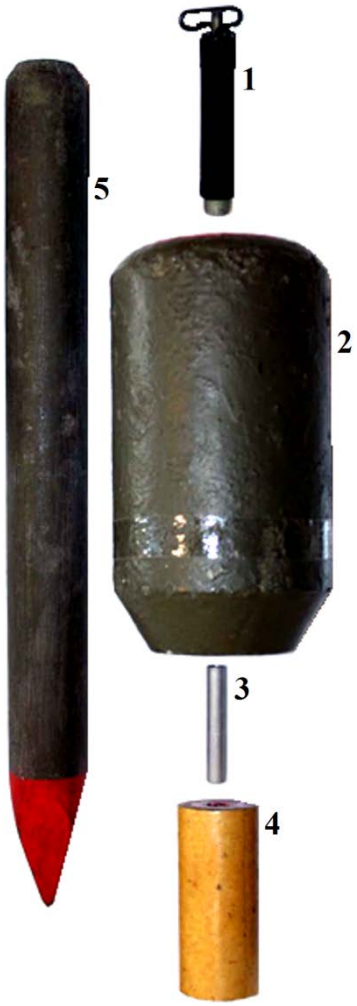
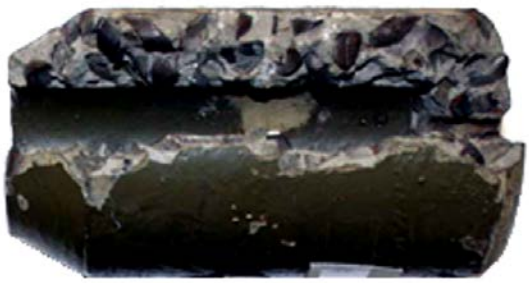
FUZE	
Type	**Characteristic**
Ro-1; Ro-10	*Metal fuze, mechanical, pressure and tension, with immediate effect.*

SAFETY CONSIDERATION THREAT

Mine is very sensitive. Removal of mines is very dangerous.

NOTICE

Anti-Personnel concrete splinter mine, has the body made of concrete containing 1,55 kg of scrap steel diagonally chopped round steel with a diameter of 8 mm and a length of 6 mm.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
		*1 - Fuze - Ro-1;* *2 - Body;* *3 - Detonator;* *4 - Bursting charge - demolition block 75 g TNT;* *5 - Wooden peg*
CUTAWAY OF BODY		
		

	FWP Ammunition	ANNEX C-99

FIELD of AMMUNITION	*Anti-Personnel Mine*
NAME	*Anti-Personnel Bounding Fragmentation Mine in Steel Case*
NAME/ASSIGNED MARK (original)	*PP Mi-Šr II*
COUNTRY of ORIGIN	*Czechoslovakia*

PP Mi-Šr II	
total weight of mine without detonators [*kg*]	*3.25*
explosive type	*poured TNT*
weight of explosive [*kg*]	*0.325*
diameter mine [*mm*]	*101*
height of mine [*mm*]	*152*
activation force (mine with fuze Ro-8 or Ro-8II) greater than [*N*]	*30*
activation force by tripwire (mine with fuze Ro-1 or Ro-10) greater than [*N*]	*40*
mine resistance against overpressure in the shock wave (mine with fuze Ro-8 or Ro-8II) [*MPa*]	*0.19 to 0.39-*
mine resistance against overpressure in the shock wave (mine with fuze Ro-1 or Ro-10) [*MPa*]	*0.01*
mine resistance against overpressure in the shock wave (mine with initiator P-1 or P-2) [*MPa*]	*0.35*
type of fuze (a landmine)	*Ro-8; Ro-8 II*
type of fuze (a booby trap with tripwire)	*Ro-1; Ro-10*
type of electric initiator (by electric detonation)	*P-1; P-2*

PACKING

Number of mines in the crate	*6*	**Weight of full crate [*kg*]**	*27.5*

DESCRIPTION

PP Mi-Šr II is used against personnel as a landmine, booby trap or command electrical detonation.

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

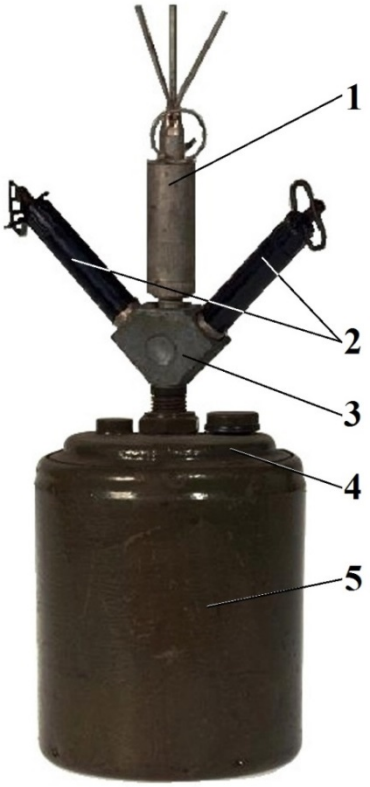
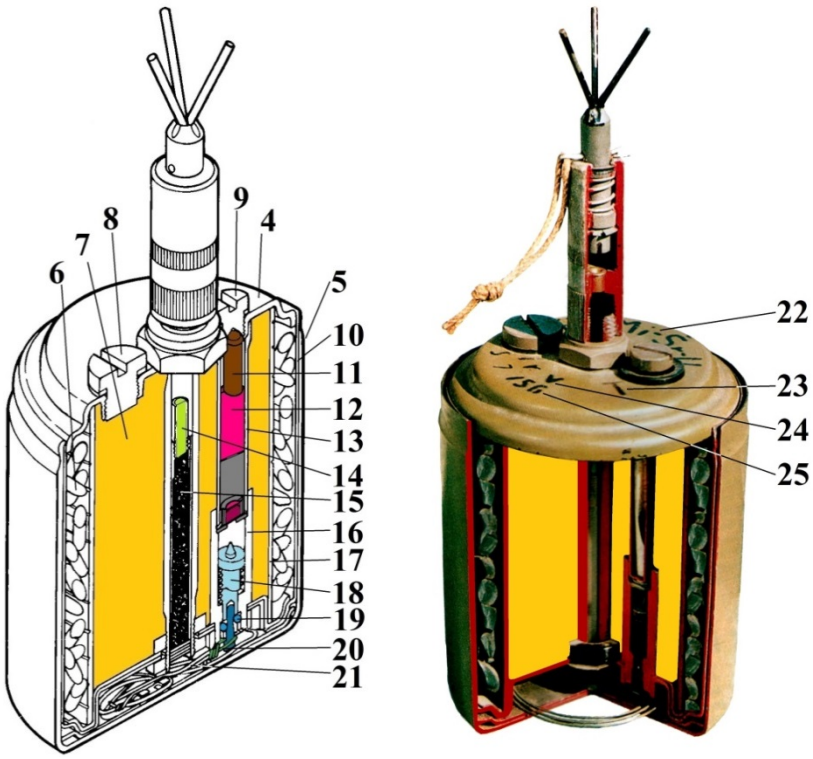
FUZE

Type	**Characteristic**
Ro-1; Ro-10	*Metal fuze, mechanical, pressure and tension, with immediate effect.*
Ro-8; Ro-8 II	*Metal fuze, mechanical, pressure, with immediate effect.*
P-1; P-2	*Electric initiators.*

SAFETY CONSIDERATION THREAT

Removal of mines is very dangerous.

NOTICE

DRAWINGS/CUTAWAY/MARKING/STENCILING	LEGEND
	*1 - Fuze - Ro-8 or Ro-8 II* *2 - Fuzes - Ro-1 or Ro-10I* *3 - Three-way connector;* *4 - Cover;* *5 - Projecting sleeve;* *6 - Chopped steel rod;* *7 - Bursting charge;* *8 - Filling hole plug;* *9 - Detonator stopper;* *10 - Inner container;* *11 - Wooden peg;* *12 - Detonator with primer;* *13 - Detonator tube;* *14 - Delay;* *15 - Propellant - black powder;* *16 - Inner fuze;* *17 - Tube of inner fuze;* *18 - Firing pin;* *19 - Release balls;* *20 - Release pin;* *21 - Firing wire;* *22 - Marking of mine;* *23 - Index of producer of mine;* *24 - Series/year of manufacture of mine;* *25 - Type of explosive*
	

	FWP Ammunition	ANNEX C-100

FIELD of AMMUNITION	*Anti-Tank Mine*
NAME	*Anti-Tank Blast Mine in a Metal Case*
NAME/ASSIGNED MARK (original)	*PT Mi-K*
COUNTRY of ORIGIN	*Czechoslovakia*

PT Mi-K	
total weight of mine with detonators and transport safety device [*kg*]	*7.8*
explosive type	*TNT*
weight of explosive [*kg*]	*4.9*
diameter mine [*mm*]	*300*
side height mine [*mm*]	*45*
maximum height of mine [*mm*]	*97*
diameter disc pressure [*mm*]	*140*
activation force greater than [*N*]	*2000*
activation weight greater than [*kg*]	*200*
effect of mine - to the width [*mm*]	*600*
mine resistance against overpressure in the shock wave [*MPa*]	*0.35 to 0.80-*
mine resistance against pressure at a pressure cap on the pressure disc [*MPa*]	*0.13 to 0.22*
type of central fuze	*Ro-5*
type of additional (anti-lift) fuze	*Ro-3*

PACKING			
Number of mines in the crate	*4*	**Weight of full crate [*kg*]**	*32.5*

DESCRIPTION

PT Mi-K is designed to provide explosive anti-tank barriers and roadblocks. Mines are placed manually (surface or underground), mechanically (surface or underground), and scattered by low-flying helicopters. It is used to break tank tracks and damage the tank chassis. This mine consists of a body (1), bursting charge (8), pressure disc (2) and fuzes (3 and 6).

COLOR and MARKING	
Body colour:	*Olive*
Text colour:	*Black*

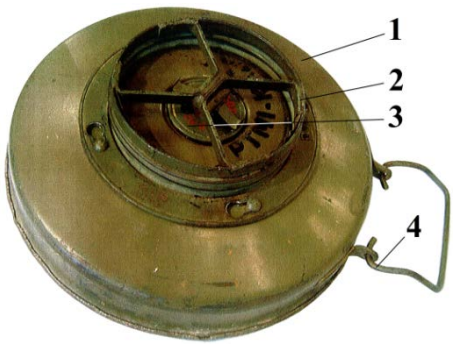
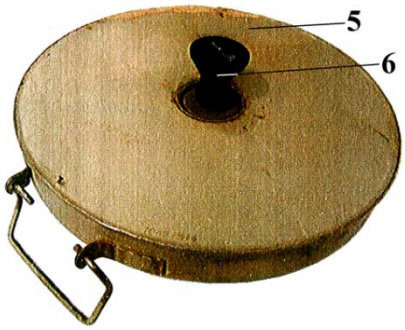
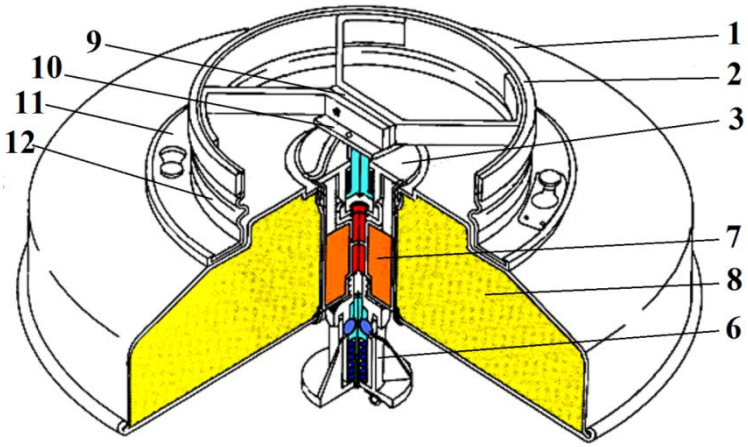
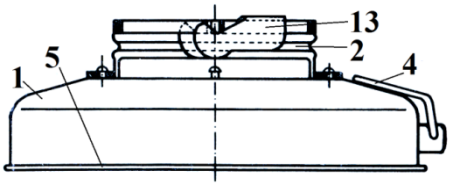
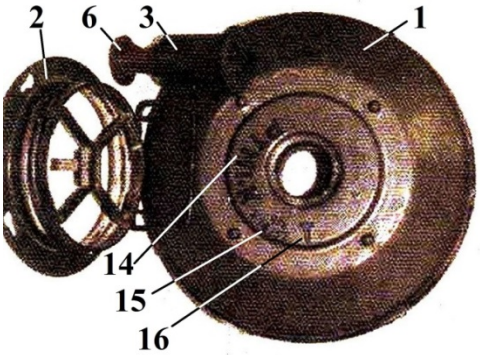
FUZE	
Type	**Characteristic**
Ro-5	*Central fuze - metal, mechanical, pressure, with immediate effect.*
Ro-3	*Anti-lift fuze, without explosives, without primer or capsule.*

SAFETY CONSIDERATION THREAT

Simple removal of mines is very dangerous because of its possible provision anti-lift fuze Ro-3.

NOTICE

Corrosion may weaken the shear pin, making this mine extremely dangerous to handle; it may also make it impossible to remove the fuze from the fuze well. When buried deeply mines used a pressure cap (17) with an enlarged surface to compress the fuze.

DRAWINGS/CUTAWAY/MARKING/STENCILING		LEGEND
PT Mi-K	BOTTOM of PT Mi-K	
		*1 - Body of mine;* *2 - Pressure disc;* *3 - Fuze Ro-5;* *4 - Handle;* *5 - Bottom of mine;* *6 - Fuze Ro-3;* *7 - Booster charge of Ro-5;* *8 - Bursting charge;* *9 - Ribs of pressure disc;* *10 - Plate of pressure disc;* *11 - Locking ring;* *12 - Resistance ring;* *13 - Transport safety device;* *14 - Marking of mine type;* *15 - Index of producer and series/year of manufacture of mine;* *16 - Type of explosive;* *17 - Pressure cap*
		
		
		

	FWP Ammunition	**ANNEX C-101**

FIELD of AMMUNITION	*Mine*
NAME	*Anti-tank Mine in a Metal Case*
TYPE	
NAME/ASSIGNED MARK (original)	*PT Mi-K II*
COUNTRY of ORIGIN	*Czechoslovakia*

PT Mi-K II	
total weight of mine with detonators and transport safetyweight [*kg*]	*7.4*
explosive type	*TNT*
weight of explosive [*kg*]	*5.0*
diameter mine [*mm*]	*300*
side height mine [*mm*]	
maximum height of mine [*mm*]	*106*
diameter disc pressure [*mm*]	
activation weight of fuze greater than [*kg*]	*130 to 160*
activation weight of pressure disc greater than [*kg*]	*300 to 450*
effect of mine - to the width [*mm*]	*600*
mine resistance against overpressure in the shock wave [*MPa*]	*0.35 to 0.80-*
mine resistance against pressure at a pressure cap on the pressure disc [*MPa*]	*0.13 to 0.22*
type of central fuze	*integrated*
type of additional (anti-lift) fuze	*Ro-3*

PACKING

Number of mines in the crate	*4*	**Weight of full crate [*kg*]**	*32*

DESCRIPTION

PT Mi-K II is designed to provide explosive anti-tank barriers and roadblocks. Mines are placed manually (surface or underground), mechanically (surface or underground), and scattered by low-flying helicopters. It is used to break the tank track and damage the tank chassis.
This mine consists of a body (1), bursting charge (10), pressure disc (2) and fuzes (3 and 9).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

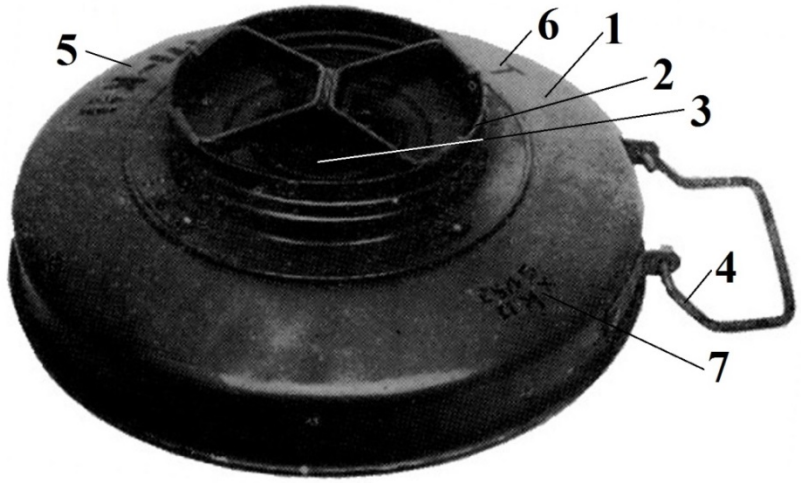
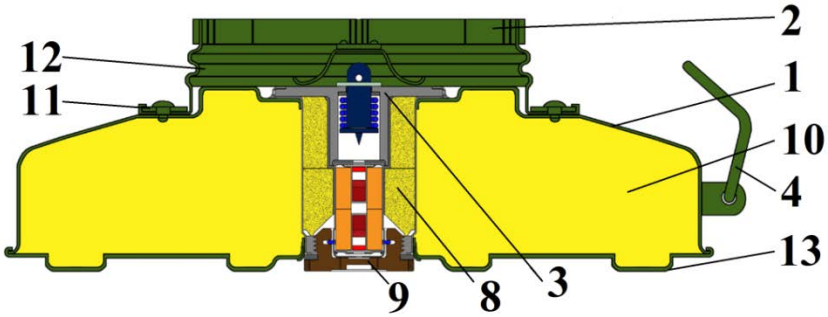
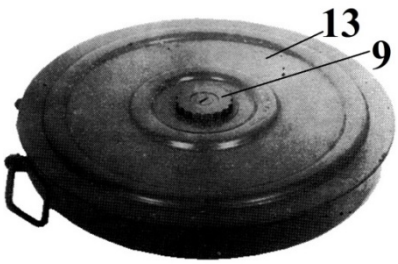
Type	**Characteristic**
integrated	*Central fuze - metal, mechanical, pressure, with immediate effect. Structure similar to that of Ro-5 fuze.*
Ro-3	*Anti-lift fuze, without explosives, without primer or capsule.*

SAFETY CONSIDERATION THREAT

Simple removal of mines is very dangerous because of its possible provision anti-lift fuze Ro-3.

NOTICE

Corrosion may weaken the shear pin, making this mine extremely dangerous to handle; it may also make it impossible to remove the fuze from the fuze well. When buried deeply mines used a pressure cap (17) with an enlarged surface to compress the fuze.

DRAWINGS/CUTAWAY/MARKING/STENCILING:	LEGEND
	*1 - Body of mine;* *2 - Pressure disc;* *3 - Fuze - integrated;* *4 - Handle;* *5 - Marking of mine type;* *6 - Type of explosive;* *7 - Index of producer and series/year of manufacture of mine;* *8 - Booster charge of fuze;* *9 - Place for fuze Ro-3;* *10 - Bursting charge;* *11 - Locking ring;* *12 - Resistance ring;* *13 - Bottom of mine;* *14 - Pressure cap*
	
	Bottom of PT Mi-K 

	FWP Ammunition	ANNEX C-102

FIELD of AMMUNITION	*Mine*
NAME	*Anti-tank Mine in a Bakelite Body*
TYPE	
NAME/ASSIGNED MARK (original)	*PT Mi-Ba III*
COUNTRY of ORIGIN	*Czechoslovakia*

PT Mi-Ba III	
total weight of mine with detonators and transport safety weight [*kg*]	*10.8*
explosive type	*TNT*
weight of explosive [*kg*]	*8.0*
diameter mine [*mm*]	*330*
side height mine [*mm*]	*78*
maximum height of mine [*mm*]	*110*
diameter disc pressure [*mm*]	*200*
activation weight greater than [*kg*]	*200*
effect of mine - to the width [*mm*]	*900*
mine resistance against overpressure in the shock wave when covered with soil [*MPa*]	*1.50-*
mine resistance against overpressure in the shock wave without covered [*MPa*]	*0.75*
type of fuze	*Ro-2*
type of additional (anti-lift) fuze	*Ro-4*

PACKING

Number of mines in the crate	*2*	**Weight of full crate [*kg*]**	*25*

DESCRIPTION

PT Mi-K II is designed to provide explosive anti-tank barriers and roadblocks. Mines are placed manually (surface or underground), mechanically (surface or underground), and scattered by low-flying helicopters. It is used to break the tank track and damage the tank chassis.
This mine consists of a body (1), bursting charge (10), pressure disc (2) and fuzes (3 and 9).

COLOR and MARKING

Body colour:	*Brown and green*
Text colour:	*White*

FUZE

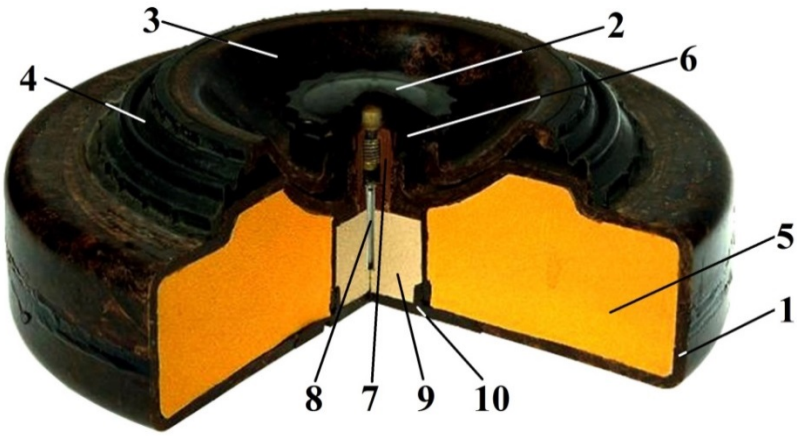
Type	**Characteristic**
Ro-2	*Central fuze - mechanical, pressure, with instantaneous effect.*
Ro-4	*Anti-lift fuze, trap reliever to ensure against to removal all types of mines with blasting agent of 400 g TNT. Fuze is instantaneous, Bakelite casing and waterproof.*

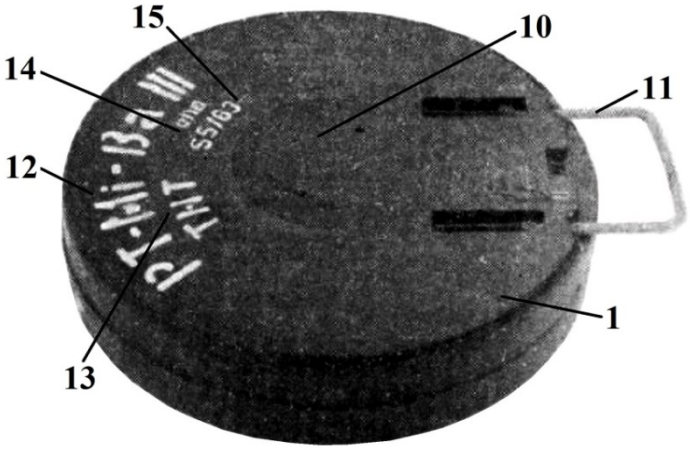
SAFETY CONSIDERATION THREAT

Simple removal of mines is very dangerous because of its possible provision anti-lift fuze Ro-4.

NOTICE

Corrosion may weaken the shear pin, making this mine extremely dangerous to handle; it may also make it impossible to remove the fuze from the fuze well. When buried deeply mines used a pressure cap (17) with an enlarged surface to compress the fuze.

DRAWINGS/CUTAWAY/MARKING/STENCILING:	LEGEND
	1 - Body of mine; *2 - Upper breech screw;* *3 - Pressure disc;* *4 - Resistive ring;* *5 - Bursting charge;* *6 - Transport safety;* *7 - Fuze;* *8 - Detonator;* *9 - Booster charge;* *10 - Lower breech screw* *11 - Handle;* *12 - Index of mine;* *13 - Type of explosive;* *14 - Index of producer;* *15 - Series/year of manufacture of mine*
	

Top of PT Mi Ba III	Bottom of of PT Mi Ba III
	

	FWP Ammunition	ANNEX C-103

FIELD of AMMUNITION	*Mine*
NAME	*Anti-tank Mine in a Bakelite Body*
TYPE	
NAME/ASSIGNED MARK (original)	*PT Mi-U*
COUNTRY of ORIGIN	*Czechoslovakia*

PT Mi-U	
total weight of mine with rod extender [*kg*]	*9.50*
weight of rod extender [*kg*]	*0.13*
explosive type	*TNT+ TNT/H-50/50*
weight of explosive [*kg*]	*7.0*
diameter mine [*mm*]	*320*
side height mine [*mm*]	*70*
maximum height of mine [*mm*]	*128*
diameter disc pressure [*mm*]	*110*
activation weight (anti-tank belt version) greater than [*kg*]	*150*
activation weight on rod extender (anti-tank bottom version) greater than [*kg*]	*30*
pierce armor thickness [*mm*]	*30*
effect of mine - to the width [*mm*]	*600*
mine resistance against overpressure in the shock wave [*MPa*]	*0.35*
type of fuze	*integrated*
type of additional (anti-lift) fuze	*Ro-4 +400 g TNT*

PACKING

Number of mines in the crate	*2*	**Weight of full crate [*kg*]**	*25.50*

DESCRIPTION

PT Mi-U is designed to provide explosive anti-tank barriers and roadblocks. Mines are placed manually (surface or underground), mechanically (surface or underground), and scattered by low-flying helicopters. It is used to break the tank track and damage the tank chassis.
PT Mi-U has two versions: 1. Full width belly attack (with rod extender) and 2. Against belts of tank.
This mine consists of body (1), bursting charge (10), pressure disc (2) and fuzes (3 and 9).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

FUZE

Type	**Characteristic**
integrated	*Central integrated fuze - mechanical, pressure with timing effect.*
Ro-4	*Anti-lift fuze, trap reliever to ensure against to removal all types of mines with blasting agent of 400 g TNT. Fuze - immediate, Bakelite casing and waterproof.*

SAFETY CONSIDERATION THREAT

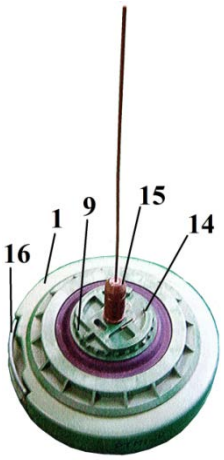
Simple removal of mines is very dangerous.

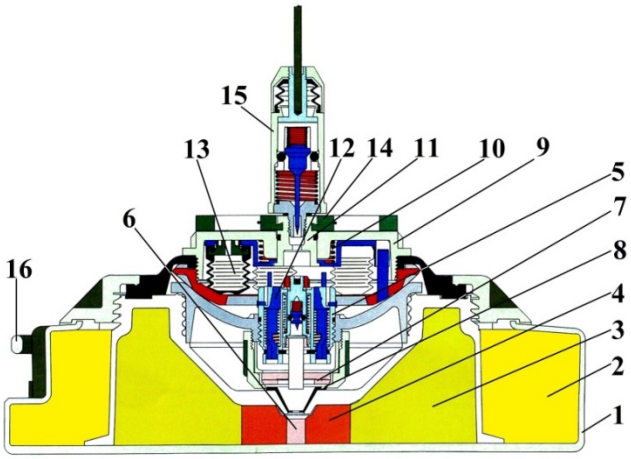
NOTICE

TNT explosive used for circumferential charge is cast. PT Mi-U with rod extender that are mechanically laid still need manual connection of the rod extender.

DRAWINGS/CUTAWAY/MARKING/STENCILING:

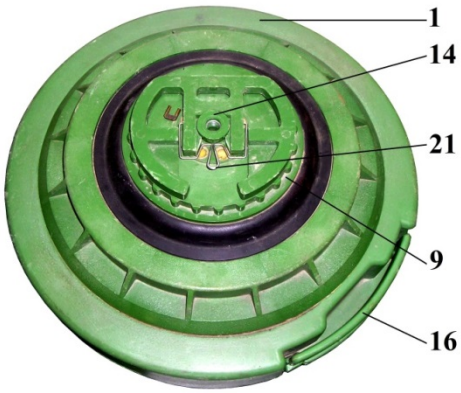
VERSION: AGAINST BOTTOM OF TANK

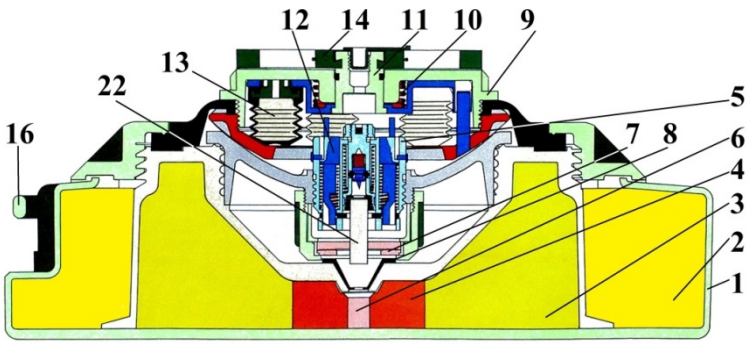




ROD EXTENDER

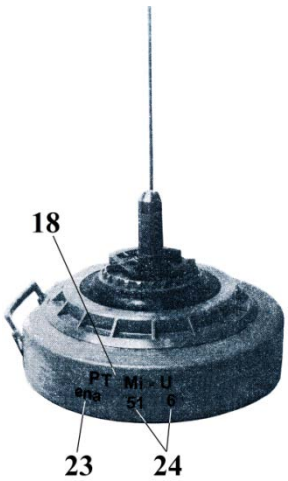
VERSION: AGAINST BELTS OF TANK





LEGEND

1 - Body of mine;
2 - Circumferential bursting charge - TNT;
3 - Central bursting charge - TNT/H;
4 - Booster charge;
5 - Fuze;
6 - Detonator cavity;
7 - Tablet with propellant;
8 - Rubber trap;
9 - Pressure disc;
10 - Spring of timing safety;
11 - Button of timing safety;
12 – Fuze ram;
13 - Rubber bellows;
14 - Transport safety;
15 - Rod extender;
16 - Handle;
17 - Index of rod extender;
18 - Index of mine;
19 - Index of producer of rod extender;
20 - Series - year of manufacture of rod extender;
21 - Wire section of transport safety;
22 - Detonator;
23 - Index of producer of mine;
24 - Year and series of manufacture of mine



	FWP Ammunition	ANNEX C-104

FIELD of AMMUNITION	*Mine*
NAME	*Anti-tank Anti-bottom Mine in a Metal Case*
TYPE	
NAME/ASSIGNED MARK (original)	*PT Mi-P*
COUNTRY of ORIGIN	*Czechoslovakia*

PT Mi-P	
total weight of mine with detonator [*kg*]	*10.0*
explosive type	*TNT/H - 50/50*
weight of explosive [*kg*]	*5.8*
diameter mine [*mm*]	*238*
height mine without fuze [*mm*]	*234*
height mine with fuze [*mm*]	*745*
activation force (the side impact on the feeler) [N]	*30*
effect of mine - to the width on the tank belts [*mm*]	*600*
effect of mines on armor - thickness [*mm*]	*150*
effect of mines	*destruction wheeled vehicle chassis*
mine resistance against overpressure in the shock wave [*MPa*]	*1.5*
activation weight of fuze greater than [*kg*]	*130 to 160*
activation weight of pressure disc greater than [*kg*]	*300 to 450*
type of additional (anti-lift) fuze	*Ro-9*

PACKING

Number of mines in the crate	*2*	**Weight of full crate [*kg*]**	*25*

DESCRIPTION

PT Mi-P is designed to provide an explosive anti-tank barrier. Mines are placed manually only (underground). , mechanically (surface or underground), and scattered by low-flying helicopters. It is used for breaking tank tracks, penetrating the bottom of tanks and combat equipment and destroying wheeled vehicles chassis.
This mine consists of a body (1), bursting charge (8) and fuze (3).

COLOR and MARKING

Body colour:	*Olive*
Text colour:	*Black*

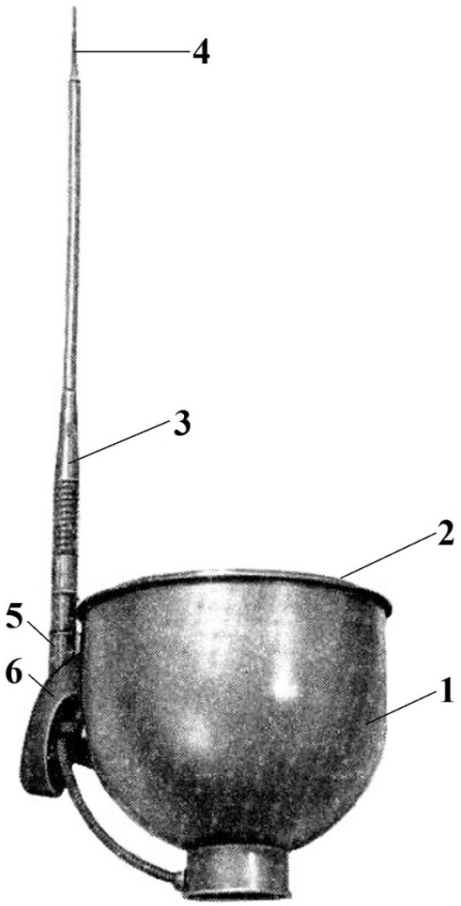
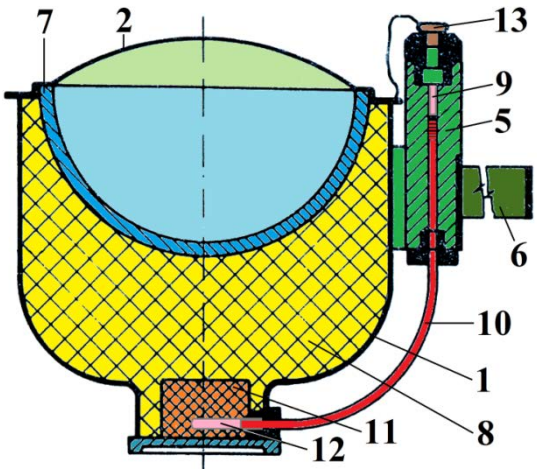
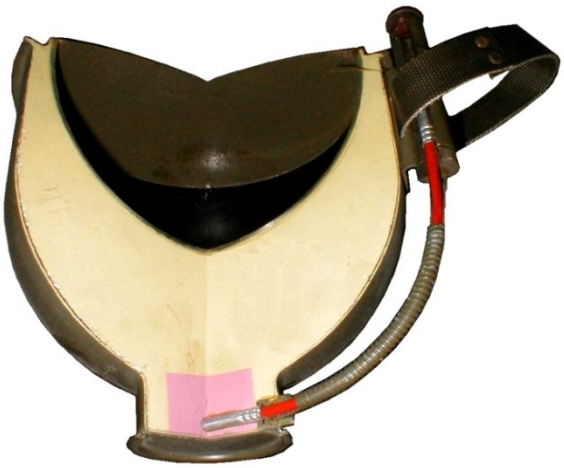
FUZE

Type	**Characteristic**
Ro-9	*Fuze - metal, mechanical, superquick, with instantaneous effect.*

SAFETY CONSIDERATION THREAT

Simple removal of mines is very dangerous. Mines which have a bent or broken fuze feeler must be disposed of on site.

NOTICE

DRAWINGS/CUTAWAY/MARKING/STENCILING:	LEGEND
	*1 - Body of mine;* *2 - Cover;* *3 – Tilt rod Fuze Ro-9;* *4 – Fuze feeler;* *5 – Fuze mount;* *6 - Handle;* *7 - Shaped charge liner;* *8 - Bursting charge;* *9 - Detonator;* *10 - Detonating cord;* *11 - Booster charge;* *12 - Detonator;* *13 - Protection plug*
	

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ANNEX D: NATO AMMUNITION AND EOD LEXICON

1. **Actuate**. To operate a firing mechanism by an influence or a series of influences in such a way that all the requirements of the mechanism for firing or for registering a target count is met. [AAP-6]

2. **Anti-countermining device**. A device fitted to a mine, designed to prevent its actuation by a countermeasure. [AOP-19(D)]

3. **Anti-handling device.** A device intended to protect a mine and which is part of, linked to, attached to or placed under the mine and which actuates the mine when an attempt is made to tamper with or otherwise intentionally disturb the mine. [AAP-6]

4. **Antitank mine.** A mine designed to immobilize or destroy a tank. [AAP-6]

5. **Anti-personnel mine.** In land mine warfare, a mine designed to be exploded by the presence, proximity or contact of a person and that will incapacitate, wound or kill one or more persons.
Note: Mine designed to be detonated by the presence, proximity or contact of a vehicle, not to a person, and that is equipped with anti-handling devices, are not considered anti-personnel land mines as a result of being so equipped. [AOP-19(D)]

6. **Arming.** As applied to explosives, weapons or weapon systems, the changing from a safe to an armed state of readiness. [AAP-6]

7. **Arming delay device**. A device fitted to a mine or any autonomous munitions designed to prevent it from being armed for a pre-set time after laying or delivery. [AAP-6]

8. **Arming pin**. A safety device inserted in a munitions, which until its removal, prevents the unintentional action of the arming cycle. Synonym „safety pin".[AAP-6]

9. **Arming wire.** A cable, wire or lanyard routed from the aircraft to an expendable aircraft store in order to initiate the arming sequence for the store upon release from the aircraft, when the armed release condition has been selected; it also prevents arming initiation prior to store release and during safe jettison. Synonym is „arming lanyard".
[AAP-6]

10. **Armour piercing.** Ammunition, bombs, bullets, projectiles, or the like designed to penetrate armour and other resistant targets.

11. **Base fuse.** Fuse located in the base of a projectile or bomb. [AAP-6]

12. **Base-ejection shell**. A type of shell which ejects its load from its base is base-ejection shell. [AAP-6]

13. **Blast wave.** Wave created by the rapid expansion of hot gases in the atmosphere which results from an explosion. The blast wave is initially a shock wave which subsequently decays into a sound wave [AAP-6].

14. **Booster**. It is a high explosive element sufficiently sensitive so as to be actuated by small explosive elements in a fuze or primer and powerful enough to cause detonation of the main explosive filling. [AAP-6]

15 **Burster**. Explosive article consisting of a small charge of explosive used to open projectiles or other ammunition in order to disperse their contents. [AOP-38(5)]

16. **Cartridge**. An assemblage of the components require to function a weapon once; i.e. gun ammunition which contains in unit assembly all of the components required to functioning the gun once, and which is loaded into the gun in one operation.

17. **Charge**. The amount of propellant required for a fixed, semi-fixed, or separate loading projectile, round or shell. It may also refer to the quantity of explosive filling contained in a bomb, mine or the like. In combat engineering, a quantity of explosive, prepared for demolition purposes. [AAP-6]

18. **Charge, shaped**. An explosive charge so shaped and designed as to concentrate its explosive force in one direction. Sometimes called “cavity charge. Use of the term “shaped charge generally implies the presence of a lined cavity. [AAP-6]

19. **Complete round.** Ammunition which contains all the components necessary for it to function. [AAP-6]

20. **Deflagration**. Chemical explosion in which the zone of chemical reaction propagates through the initial medium at a subsonic velocity, mainly by thermal conduction. [AOP-38]

21. **Explosive train**. A train of combustible and explosive elements arranged in the order of decreasing sensitivity, inside a fuze, projectile, bomb, or the like.

The function of the explosive train is to accomplish the controlled augmentation of a small impulse into one of suitable energy to cause the main charge of the ordnance to function.

A fuze explosive train may consist of a primer, a detonator, a relay, a lead and a booster charge, one or more of which may be either omitted or combined.

If the bursting charge is added to the foregoing train, it becomes a bursting charge explosive train.

A propelling charge train may consist of a primer, igniter or igniting charge, usually black powder, and any of the various types of propellants.

22. **Filling.** The explosive content of a cartridge, charge, shell, bomb, complete round, component or separate part of a round. The contents of a round or component when not strictly explosive in kind, such as smoke or chemical, are normally referred to as “charging”.

23. **Fin**. A fixed or adjustable vane or air foil affixed longitudinally to an aerodynamically or ballistically designed body for stabilizing purpose.

24. **Fixed ammunition.** Ammunition in which the cartridge case is permanently attached to the projectile. [AAP-6]

25. **Fragmentation.** Term applied to ordnance, indicating that it is primarily intended to produce a fragmentation effect.

26. **Fragmentation effect**. Shrapnel and small objects designed to be accelerated by explosive forces.

27. **Fuze.** A device which initiates an explosive train. [AAP-6]

28. **Fuze, all- way**. An impact fuze designed to function regardless of the direction of impact. Commonly called “all-ways acting” fuze.

29. **Fuze, bore safe.** Type of fuze having an interrupter in the explosive train that prevents a projectile from exploding until after it has cleared the muzzle of weapon.

30. **Fuze cavity**. A recess in a charge for receiving a fuze. [AAP-6]

31. **High explosive** (HE). An explosive which normally detonates rather than deflagrates or burns; that is, the rate of advance of reaction zone into the uncreated material exceeds the velocity of sound in the unreacted material. High explosives are divided into two classes according to their sensitivity to heat and shock: primary high explosives and secondary high explosives.
Note: Some authorities maintain that high explosives and primary explosives are entirely separate entities.

32. **Hollow charge**. A shaped charge producing a deep cylindrical hole of relatively small diameter in the direction of its axis of rotation. [AAP-6]

33. **Igniter**. A device designed to produce a flame or a spark to initiate an explosive train. [AAP-6]

34. **Impact action fuze**. A fuze that is set in action by the striking of a projectile or bomb against an object. e.g. percussion fuze, contact fuze. Also called Direct Action Fuze. [AAP-6]

35. **Inert filling**. A prepared non-explosive filling of the same weight as the explosive filling. [AAP-6]

36. **Initiation**. The action of a device used as the first element of an explosive train which, upon receipt of the proper impulse, causes the detonation or burning of an explosive item. [AAP-6]

37. **Kinetic energy ordnance**. Ordnance designed to inflict damage to fortifications, armoured vehicles, or ships upon impact by shattering, spalling, or piercing.

The ordnance may be solid or may contain an explosive charge intended to function after penetration.

38. **Low explosive**. Substance or mixture of substances which is designated to deflagrate. *Note: Low explosive does not produce a shock wave, generally requires confinement to explode.*

39. **Mine**. In land mine warfare, an explosive munitions designed to be placed under, on or near the ground or other surface area and to be actuated by the presence, proximity or contact of a person, land vehicle, aircraft or boat, including landing craft. [AAP-6]

40. **Munroe effect**. The effect produced by a shaped charge. In Europe sometimes called “Neumann effect”. When a liner is used, the effect is termed “Mohaupt effect”.

41. **Nose.** The foremost point of bomb, etc. Indicates, in the case of fuze nomenclature, that the fuze is to be attached to nose of the ordnance for which intended; and, in the case of the component of a fuze, that the component is to be used with a nose fuze.

42. **Piezoelectric.** The property of certain materials (especially crystals) to develop an electrical charge or potential difference when subjected to mechanical force or, conversely, to produce a mechanical force when a voltage is applied across the material.

43. **Pin, arming.** A pin partly inserted into ordnance to prevent the arming process from starting until the pin is removed.

44. **Pin, bore riding**. A safety pin which is place in the fuze while the projectile or rocket is in the gun barrel or launching tube. It is ejected from the fuze by the effect of centrifugal force or spring action beyond the muzzle.

45. **Pin, firing.** A pin used in the firing mechanism of a fuze, bomb, projectile, etc., which pierces or strikes a sensitive explosive to initiate an explosive train or a propelling charge.

46. **Pin, shear**. A pin or wire provided in ordnance to hold parts in a fixed relationship until forces exerted on one or more of the parts cause shearing of the pin or wire. The shearing is usually caused by setback or set forward (impact) forces. The shear pin or wire may be augmented by an additional safety device during transportation of ordnance.

47. **Plastic explosive**. Explosive, which is malleable at normal temperatures.

48. **Plug, base.** A plug used to close the base of some types of projectiles. It may include provision for housing a fuze.

49. **Plug, nose**. A component that threads into and seals the nose of a fuze and, usually but not always, extends the fuze contour. It is not intended to be removed.
50. **Powder**. An explosive in powder form; that is, in small granules or grains, such as black powder or smokeless propellant of fine granulation.

51. **Primer.** Cap containing a primary explosive and a booster.
Note 1: The primer function consists of transforming an external action, normally mechanical or electrical, in sufficient explosive energy to ignite the primary charge.
Note 2: In a gun cartridge, the primer is the explosive device containing a cap and a booster charge or pyrotechnic which is used to ignite the propellant charge.
[AOP-38]

52. **Projectile.** An object capable of being propelled by a force normally from a gun and continuing in motion by virtue of its kinetic energy. [AAP-6]

53. **Projectile, High explosive squash head** (HESH) BRIT. A thin metal shell, filled with plastic explosive. The projectile is designed to squash against an armoured target before detonation and to defeat the armour by producing spalls which are detached with considerable velocity from the back of the target plate. Also called a “Projectile high explosive plastic (HEP)”, especially by the USA.

54. **Propellant.** That which provides the energy for propelling something; specially an explosive powder charge for propelling a bullet, shell, or the like.

55. **Proximity fuze**. A fuze wherein primary initiation occurs by remotely sensing the presence, distance, and/or direction of a target or its associated environment by means of a signal generated by the fuze or emitted by the target, or by detecting a disturbance of a natural field surrounding the target. [AAP-6]

56. **Rounds.** A complete assembly of a projectile (with or without fuze), the propelling charge in a cartridge case and the means of igniting the propelling charge. The word is also used in the expression ‘supply by complete rounds’ meaning that all the components necessary for the ammunition to be fired are issued together.

57. **Self- destroying fuze**. A fuze designed to burst a projectile before the end of its flight. [AAP-6]

58. **Striker**. An extension of a firing pin. That part which strikes a primer or other charge to initiate an arming, but not a firing explosive train

59. **Submunition**. Any munitions that, to perform its task, separates from a parent munition. [AAP-6]

60. **Time fuze**. A fuze which contains a graduated time element to regulate the time interval after which the fuze will function. [AAP-6]

61. **Tube, flash**. A tubular item designed to transmit an igniting spark, flame, or the like from a fuze or the like to an explosive.

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